DECEMBER 1981
75p

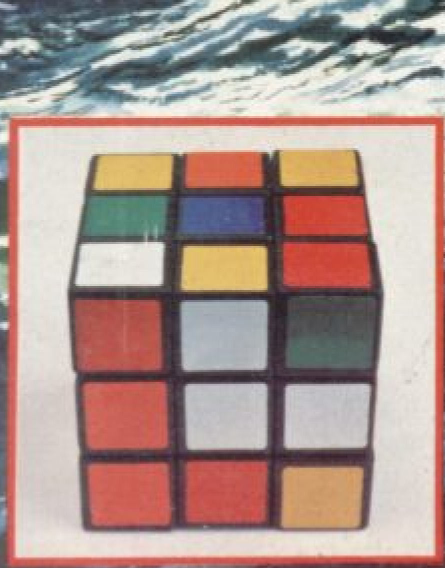
COMPUTER & VIDEO GAMES

THE MAGAZINE THAT MAKES COMPUTERS FUN FUN FUN



USE THIS HANDY FREE GIFT IN OUR GREAT TEMPLATE COMPETITION

ZX81 PET APPLE TANDY PROGRAMS FOR THESE & MANY MORE

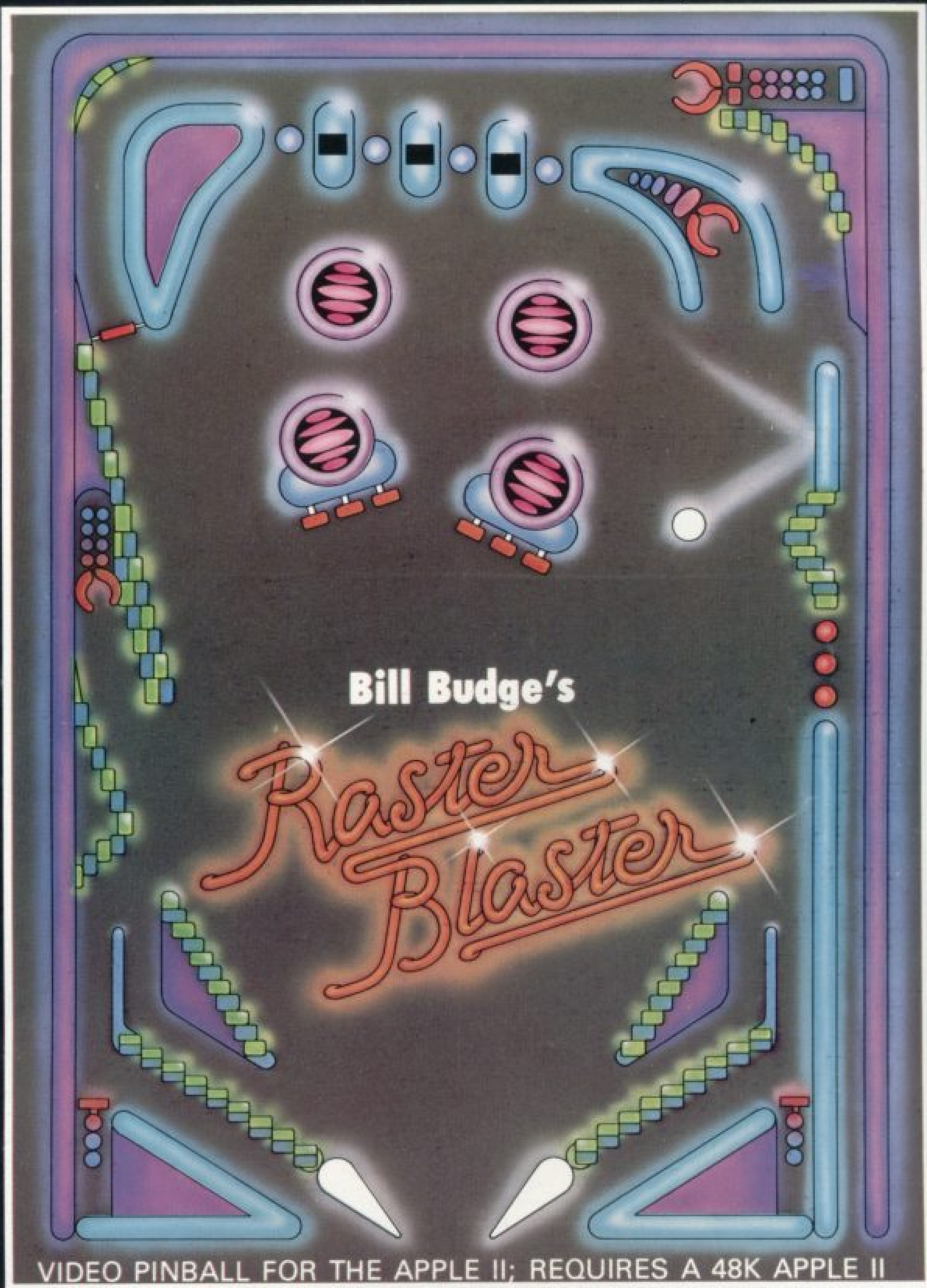


'ROUND THE HORN
A THRILLING SEAFARING RACE

ARE YOU THE WORLD'S BEST ARCADE GAME PLAYER?
ENTRY FORMS INSIDE

SOLVE THE CUBE

NEW FROM THE LEISURE GROUP



RASTER BLASTER

The speed and dynamics of Raster Blaster will astound you. It is an amazingly realistic full-colour pinball simulation, keeping separate scores for up to 4 players. 'Easy' and 'hard' options can be set and the paddles control the force of ball release as well as the flippers. Raster Blaster comes complete on a 5¼" diskette and is available for just £15.50. Clip the coupon and enclose a cheque or postal order payable to 'The Leisure Collection'. Please allow 14 days for delivery.

CLIP THIS COUPON AND SEND IT TO: EMAP LTD., DEPT CVG, DURRANT HOUSE, 8 HERBAL HILL, LONDON EC1

PLEASE SEND ME RASTER BLASTER

I enclose a cheque/ postal order for £15.50

Name ______

Address ______

Apple II is a registered trademark of Apple Computer, Inc.

COMPUTER & VIDEO GAMES

CONTENTS

No 2 December 1981

5 MAILBAG
What do you think of it so far?

9 COMPETITIONS
So you solved our free puzzle . . . Now try the Great Template Competition

12 GAMES NEWS
With Christmas just around the corner, start compiling your games package list here

17 CHESS
Mate in up to 62 moves. Max Bramer takes you back to the first chess-playing electronic marvel

19 GO
The most popular game in the world — and one of the greatest computer challenges

20 BRAINWARE
Try our champagne games. Mind Routines for the mathematical and Nevera's Crossword for the literary-minded

24 VIDEO SCREEN
Games centres to make your T.V. make music — and war

27 THE BUGS
All you ever wanted to know about Screaming Foul-up but didn't know how to ask

29 ADVENTURE
Write your own adventure program. Keith Campbell gives the tips

30 ARCADE ACTION
Meet the unlikeliest arcade screen hero of them all in Frogger

32 CHOMP
The deadly Sharp game for apprentice poisoners

36 BREAKOUT
As compulsive as ever on the Atom. The only "bat and ball" game you still can't put down

38 GOAL
Score over your Apple in this strategic struggle for supremacy

42 MINI GOLF
The park putting green was never as addictive as this Atari game

46 POT SHOT
VIC serves up the drinks as fast as you can shoot them down

50 'ROUND THE HORN
Find your sealegs in this thrilling Tandy seafaring race to earn California's gold

58 COSMAX
Space Invaders in 1K. The ZX81 challenges you to send the aliens packing

60 SOLVE THE CUBE
We gave Rubik's tantalizing puzzle to our Pet and made it child's play

68 KIT KORNER
The Sinclair may be breaking sales records but it is not without its problems. Keith Mott goes trouble-shooting

70 CHRISTMAS PARADE
Don't just trust to Santa, let us give you a run-down on the latest electronic stocking-fillers

72 SOUNDS
Does your computer squeak when you want it to roar? David Annal can boost your decibels

74 PRACTICAL PROGRAMMING
Are you making the most of your memory? Let Ted Ball jog it into action

77 GRAPHICS
Now bring that space invader to life, Gary Marshal gets things moving

78 SOFTWARE REVIEWS
Stick out your thumb and set off to discover the universe in The Hitch-Hikers' Guide to the Galaxy — an adventure with a difference

84 DOWN TO BASIC
Moira Norrie guides you through the world's most widespread computer language — micro by micro

90 SOFTWARE GLOSSARY
We all slip into jargon now and again — but now there's a way out

96 HARDCORE
What else could we call it? A guide to the low-cost computer market

97 AD INDEX

Editor Terry Pratt
Assistant Editor Elspeth Joiner
Editorial Assistant Susan Cameron
Art Director Paul Flint
Design Linda Freeman
Illustrator Gary Scrace
Advertisement Manager Simon Teager
Advertisement Executives Rita Lewis, Neil Wood
Publisher Tom Moloney

Editorial and Advertisement offices: Durrant House, 8 Herbal Hill, London EC1R 5JB; Telephone 01-837 3699.

COMPUTER AND VIDEO GAMES POSTAL SUBSCRIPTION SERVICE

By using the special Postal Subscription Service, copies of COMPUTER AND VIDEO GAMES can be mailed direct from our offices each month to any address throughout the world. All subscription applications should be sent for processing to COMPUTER AND VIDEO GAMES (Subscription Department), EMAP NATIONAL PUBLICATIONS LTD., BRETTON COURT, BRETTON, PETERBOROUGH. PE3 8DZ. All orders should include the appropriate remittance made payable to COMPUTER AND VIDEO GAMES.

Annual subscription rates (12 issues):

UK and Eire	£10.00
Overseas surface mail	£12.00
Airmail Europe	£20.00

Additional service information including individual overseas airmail rates available upon request.

Published and distributed by EMAP National Publications Ltd.
Printed by Eden Fisher (Southend) Limited, 555, Sutton Road, Southend-on-Sea, Essex.

ISSN 0261 3697.

Cover: Illustration by Tony Gibbons

NEXT MONTH

WE uncover the seamier of the software business in our January issue. An "X" Certificate is slapped on our review pages as Elspeth Joiner tracks down and gets to grips with a copy of Softporn — one of the new generation of pornographic computer games. Should you be dressing your micro in a plastic mack?!

WE take the wraps off the 1981 stocking-fillers this issue but what has Christmas '82 in store? We preview the British Toy & Hobby Fair and its store of electronic wonders the kids will be clamouring for, a year from now.

OUR Treasure Hunt wins top billing in the January games program listings. A fully-fledged adventure for you to key-in. You can tackle a ferocious creature of fantasy in Dragon Druggin' and Sinclair owners will find three 1K wonders for their micros.

THE arcade game which is being tipped as the game to watch in '82. We look at the game which will be filling video screens around the country in Arcade Action. Plus your last chance to bid to be the Best Arcade Game Player in the World and the final three arcade creatures which could help you win a Taito space invaders table of your very own.

ALL this on top of our first look at the computerised Bridge scene, our regular round-up of the latest games and first-class features. Make 1982 a year to remember by starting it off with a copy of Computer & Video Games.

NEXT ISSUE ON SALE DECEMBER 16TH

THE SHARP MZ-80K HAS GOT IT ALL

STOP PRESS... NOW AVAILABLE
BASIC COMPILER
PASCAL (CASSETTE BASED)
DOUBLE PRECISION DISC BASIC



Since its introduction the Sharp MZ-80K has proved to be one of the most successful and versatile microcomputer systems around. Sharp now have a comprehensive range of products ready to make the powerful MZ-80K with its Printer and Disc Drives even more adaptable.

Products include:- Universal Interface Card, Machine Language and Z-80 Assembler packages, CP/M* plus a comprehensive range of software.

*Trade mark of Digital Research Ltd.

You'll find all the help and advice you need about the MZ-80K at your Specialist Sharp Dealer in the list below.

If there is no dealer in your area, or if you require any further information write to:- Computer Division, Sharp Electronics (UK) Ltd., Sharp House, Thorp Road, Newton Heath, Manchester M10 9BE.

SHARP
First, and foremost

GET IT ALL HERE...

AVON
BCG Computer Systems Ltd.,
Bristol. Tel: 0272 425338
Decimal Business M/Cs Ltd.,
Bristol. Tel: 0272 294591
BERKSHIRE
Computer 100,
Bray. Tel: 0628 35619
Newbear Computing Store Ltd.,
Newbury. Tel: 0635 30505
BIRMINGHAM
Camden Electronics,
Small Heath. Tel: 021 773 8240
Electronic Business Systems Ltd.,
Birmingham. Tel: 021 384 2513
Jax Rest Ltd.,
Birmingham. Tel: 021 328 4555
Newbear Computing Store Ltd.,
Birmingham 826.
Tel: 021 707 7170
BUCKINGHAMSHIRE
Curry's Microsystems,
High Wycombe. Tel: 0494 40262
Interface Components Ltd.,
Amersham. Tel: 02403 22307
CAMBRIDGE
The Avery Computing Co Ltd.,
Bar Hill. Tel: 0954 80991
CHESHIRE
Bellard Electronics Ltd.,
Chester. Tel: 0244 380123
Charlesworth of Crewe Ltd.,
Crewe. Tel: 0270 56342
Chandos Products,
New Mills. Tel: New Mills 44344
CR Technical Services,
Chester. Tel: 0244 317549
Fletcher Worthington Ltd.,
Hale. Tel: 061 928 8928
Newbear Computing Store Ltd.,
Stockport. Tel: 061 491 2290
Ors Group Ltd.,
Warrington. Tel: 0925 67411
Sumlock Software,
Warrington. Tel: 0925 574593
CLEVELAND
Hunting Computer Services Ltd.,
Stockton-on-Tees. Tel: 0642 769709
Intex Datalog Ltd.,
Stockton-on-Tees. Tel: 0642 781193
DEVON
Crystal Electronics Ltd.,
Torquay. Tel: 0803 22699
Plymouth Computers,
Plymouth. Tel: 0752 23042
DURHAM
Neecos (DP) Ltd.,
Darlington. Tel: 0325 69540
ESSEX
Prorole Ltd.,
Westcliff-on-Sea. Tel: 0702 335298
Wilding Office Equipment,
Ilford. Tel: 01 514 1525
GLOUCESTERSHIRE
Gloucestershire Shop Equipment Ltd.,
Gloucester. Tel: 0452 36012
The Computer Shack,
Cheltenham. Tel: 0242 584343
HAMPSHIRE
Advanced Business Concepts,
New Milton. Tel: 0425 618181
Xitan Systems Ltd.,
Southampton. Tel: 0703 39890
HEREFORD
BMP,
Little Dewchurch. Tel: 021 643 3832
HUMBERSIDE
Commercial Systems Ltd.,
Hull. Tel: 0482 20500
Silicon Chip Centre,
Grimsby. Tel: 0472 45353
KENT
Technolink Europa Ltd.,
Tunbridge Wells. Tel: 0892 32116
Video Services (Bromley) Ltd.,
Bromley. Tel: 01 460 8833
LANCASHIRE
Nelson Computer Services,
Rawtenstall. Tel: 0706 229125
Sumita Electronics Ltd.,
Preston. Tel: 0772 51686
The Micro Chip Shop,
Blackpool. Tel: 0253 403122
LEICESTERSHIRE
Gilbert Computers,
Lubenham. Tel: 0858 65894
G.W. Cowling Ltd.,
Leicester. Tel: 0533 553232
Leicester Computing Centre,
Leicester. Tel: 0533 556268
Mays Hi-Fi,
Leicester. Tel: 0533 22212
LINCOLNSHIRE
Howes Elect & Autom. Servs.,
Lincoln. Tel: 0522 32379
Z.R. Business Consultants,
Lincoln. Tel: 0522 31621
LONDON
Bridgewater Accounting,
Whetstone. Tel: 01 446 0320
Butel-Comco Ltd.,
Hendon. Tel: 01 202 0262
Central Calculators Ltd.,
London EC2. Tel: 01 729 5588
Dean's,
London W8. Tel: 01 937 7896
Digital Design and Development,
London W1. Tel: 01 387 7388
Euro-Calc Ltd.,
London EC2. Tel: 01 729 4555
Lion Computing Shops Ltd.,
London W1. Tel: 01 637 1601
Scope Ltd.,
London EC2. Tel: 01 729 3035
Sumlock Bondain Ltd.,
London EC1. Tel: 01 253 2447
MANCHESTER
The Byte Shop,
Manchester M1. Tel: 061 236 4737
Sumlock Electronic Services Ltd.,
Manchester M3. Tel: 061 834 4233
MERSEYSIDE
Microdigital Ltd.,
Liverpool. Tel: 051 227 2535
NORFOLK
Sumlock Bondain (East Anglia)
Norwich. Tel: 0603 26259
NORTHAMPTONSHIRE
Computer Supermarket,
Corby. Tel: 05366 62571
NORTHERN IRELAND
Bromac (UK),
Co. Antrim. Tel: 023831 3394
O & M Systems,
Belfast. Tel: 0232 49440
NOTTINGHAMSHIRE
Mansfield Business M/C Ltd.,
Mansfield. Tel: 0623 26610
OXFORDSHIRE
Oxford Computer Centre,
Oxford. Tel: 0865 45172
REPUBLIC OF IRELAND
O'Connor Computers Ltd.,
Galway. Tel: 0009 61173
Sharptext,
Dublin 2. Tel: 0001 764511
Tommorrows World Ltd.,
Dublin 2. Tel: 0001 776861
SALOP
Computer Corner,
Shrewsbury. Tel: 0743 59788
SCOTLAND
A & G Knight,
Aberdeen. Tel: 0224 630526
Business and Electronics M/Cs,
Edinburgh. Tel: 031 226 5454
Esco Computing Ltd.,
Glasgow. Tel: 041 204 1811
Micro Centre,
Edinburgh. Tel: 031 556 7354
Micro Change,
Glasgow. Tel: 041 554 1462
Microforth,
Dunfermline. Tel: 0383 34954
Moray Instruments Ltd.,
Elgin. Tel: 0343 3747
Pointer Business Equipment Ltd.,
Glasgow. Tel: 041 332 3621
SOMERSET
Norset Office Supplies Ltd.,
Cheddar. Tel: 0934 742184
STAFFORDSHIRE
W.B. Computer Services,
Cannock. Tel: 0543 75555
SUFFOLK
C.J.R. Microtek Co. Ltd.,
Ipswich. Tel: 0473 50152
SURREY
3D Computers,
Surbiton. Tel: 01 337 4317
Microlines Ltd.,
Kingston. Tel: 01 546 9944
Petalect,
Woking. Tel: 04862 69032
R.M.B. Ltd.,
Croydon. Tel: 01 684 1134
Saradan Electronic Services,
Wallington. Tel: 01 669 9483
SUSSEX
Crown Business Centre,
Eastbourne. Tel: 0323 639983
Gamer,
Brighton. Tel: 0273 698424
M & H Office Equipment
Brighton. Tel: 0273 697231
WALES
Limrose Electronics Ltd.,
Wrexham. Tel: 097 883 5555
Morriston Computer Centre,
Swansea. Tel: 0792 795817
Sigma Systems Ltd.,
Cardiff. Tel: 0222 21515
WARWICKSHIRE
Business & Leisure Microcomputers,
Kenilworth. Tel: 0926 512127
WILTSHIRE
Everyman Computers,
Westbury. Tel: 0373 823764
YORKSHIRE
Bits & P.C.'s
Wetherby. Tel: 0937 63744
Datron Micro-Centre Ltd.,
Sheffield. Tel: 0742 585490
Huddersfield Computer Centre,
Huddersfield. Tel: 0484 20774
Omega,
Leeds. Tel: 0532 704499
Ram Computer Services Ltd.,
Bradford. Tel: 0274 391166
Superior Systems Ltd.,
Sheffield. Tel: 0742 755005

Also at selected Lasky's and Wildings Office Equipment Branches.

MAILBAG

MORE LETTERS on Page 7

PROGRAM TO PUZZLE OVER

Dear Sir

FREE PUZZLE PROGRAM

```
10 PRINT "TAKE PENCIL AND
   PAPER"
20 PRINT "EXAMINE CARDS.
   CALL NUMBERED SIDES 'A'
   AND UN-NUMBERED SIDES
   'B'."
30 PRINT "STARTING AT ZERO
   (TWELVE O'CLOCK)
   DEGREES = 1 SUCCES-
   SIVELY NUMBER EACH 45
   DEGREES 1 TO 8"
40 PRINT"MATCH AND LIST
   MATCHING SYMBOLS. FOR
   EXAMPLE 1A1 = 2B2 AND
   4A4"
50 PRINT "CONSULT LIST AND
   MATCH CARDS"
60 PRINT"1A5 = 2B3, 2B1 = 4A8,
   4A6=3A3, 3A1=1A7"
70 REM I THINK THIS PROGRAM
   DESERVES A PRIZE FOR
   AUDACITY, EVEN IF ITS
   ONLY A YEAR'S SUBSCRIP-
   TION TO YOUR NEW AND
   EXCELLENT (GROVEL,
   GROVEL) MAGAZINE.
```

Peter Brown
West Bridgford
Nottingham

GAME FOR A NEW MODEL

Dear Sir,

Firstly, can I congratulate you on a, happily, very different magazine which I think is assured of being a long and lasting success. I have a Tandy TRS-80 Model 1 and look forward to keying in Tarot when I have the time. However I am thinking of upgrading to the new Model III machine but am waiting to see whether any games software becomes available for it.

Do you know if any software houses are going to specialise in the Model III Tandy. I have quite a library of Model I discs and would like to build up a similar one for the new machine.

J. Hodgkiss
Harrow
Middlesex

Editor's reply: The best answer here, is that the Model III does have a conversion facility so that Model I discs can be changed to run on the upgraded machine. The technique is well documented in the Model III's TRS DOS manual.



A TALE OF TRIAL AND ERROR

To whom it may or may not concern (in other words, to the person who doesn't want to concern him/herself with it, and I don't blame you!).

I wish unhappily to tell you that I have here the solution to November's puzzle. Unfortunately, we (my family) won't have any sort of programmable or semi-programmable computer or T.V. game until Christmas, when we get the Atari T.V. game, and thus, I was not able to think up a suitable program to run on the nearest computer, **five miles away** in Portadown.

So I tried trial and error, and then I tried maths, and with a little luck stumbled on the solution at roughly 7.30 (I had bought this magazine at 3.30).

What I wish to know is: is it possible to get some sort of wooden spoon? If so, I would like very much for you to send me as much info as you can legally gain from Atari about their T.V. game. **But wait for it . . . in return** I will give an honest criticism of **YOUR** magazine! READY? . . . (clever eh?) RUN.

For a start, though I run the risk of being shot, I think your magazine centres too much on the actual games programs.

Secondly, I find only one page for the Bugs, which, I think, are highly entertaining and should be given more room (by the way, the artwork is incredible).

Thirdly, the words, "hardware" and "software" are thrown around like ping-pong balls (what are pseudo random numbers?)

To finish, I think your Basic programming guide is a great help to my classes. I do computers for "O" level but unfortunately, our computers won't arrive until January.

Colin Agnew
Lurgan
Craigavow
Co. Armagh

Editor's reply: To all the many people who wrote in with solutions to our giveaway puzzle: congratulations, you did much better than I did!

But without a computer program to go with them, I'm afraid the fact that you solved the puzzle (I have heard of solution times ranging from 30 seconds to two hours) is not enough to win you a computer — we need a program listing as well.

MAILBAG

CITY BOMB BOMBS OUT

Dear Sir,
Having just purchased the first edition of your magazine, I was sorry to find so many faults in your City Bomb program. I have a ZX80 with new RAM and am very new to programming but after much puzzling, I finally got the program to run.

Apart from this I found the magazine very good.

J. Wilson
Harlow
Essex

Editor's reply: We were ashamed to discover the mistakes that had crept into the City Bomb listing. We were made to do penance by rushing around answering the many queries about the listing after we appeared in the newsagents.

For the record: Part of line 160 went mysteriously missing, it should read:

```
160 IF NOT F = 118 AND F>0
    THEN GOTO 700
```

A bracket escaped from line 560, it should read:

```
560 LET X =INT ((RND*2) +X)
```

CAUGHT IN THE TRAP

Dear Sir
I've just seen your new *Computer & Video Games*, and on the whole I think it is quite excellent.

Unfortunately you have fallen into the "trap" of those 'zines before you.

You have published nine programs for nine computers, but, who, in the home computer hobby circles, has access to nine computers? I'm sure that with a bit of research it would be possible to produce a page of computer dialects.

I'm not suggesting you do it with every command, just those that have their own dialect.

In addition I suggest a similar thing before each program, giving the alternative POKEs for each machine etc.

As hardly anyone has access to nine computers, this would make nine programs accessible to almost everyone, and I'm sure it would put you "head and shoulders" over the other 'zines, who just say: "the POKEs have to be changed" — but to what?), and would almost certainly ensure your survival in a competitive field.

I look forward to your Adventure series, especially writing your own.

B. A. Moore
Bolton
Lancs

Editor's reply: That is a perfect solution Mr. Moore but I think we would soon run into problems if we tried to produce a table with each of the many computers' special Basic commands. However, we have already adopted your idea in our *Down to Basic* pages, where we are teaching the language with reference to each machine's statements and how to transfer a command from one to another.

A CHANCE TO REVIEW

Dear Sir,
Thankyou for a marvellous magazine which I thoroughly enjoyed. I would like to contribute to the "mag" myself and wondered if I could offer my services as a reviewer of games on the ZX81 and possibly the Acorn Atom (after Christmas).

I have acted as a reviewer for many of the lesser known games magazines and would welcome the chance to tackle some of the many computer cassettes now out on the market.

I also have a Philips G7000 games centre which I could utilise on your behalf in reviewing their cassettes.

Either way can I wish you all the best for the future of a welcome addition to the magazine world.

T Greener
Rickmansworth
Herts

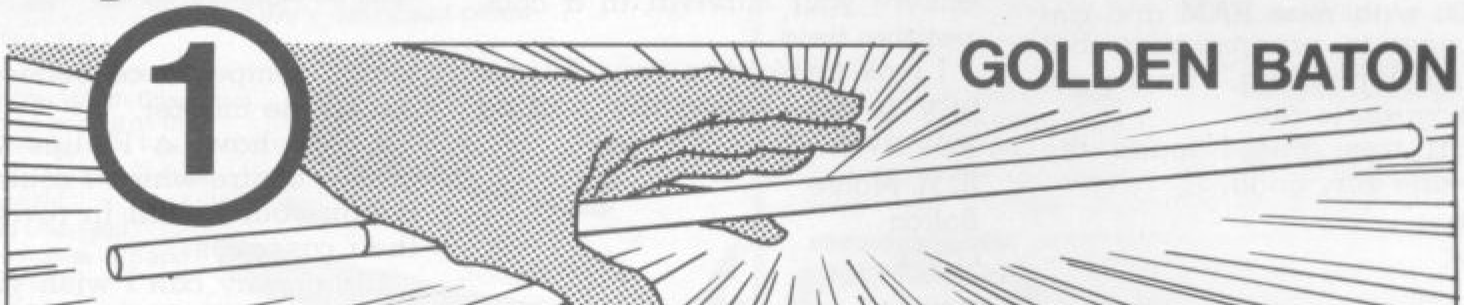
Editor's reply: We have received several letters already from people who would like to help us out with our reviewing of games and TV centre cartridges. We do use outside reviewers and would welcome some additions to our list of helpers, so if you are interested please write and let us know which machines you have access to and we will try to send you some tapes and see what sort of a job you manage. If possible please enclose details of whether you can use disc drives and give us a work and home phone number to allow us to contact you easily. If we get swamped with reviewers for a certain machine then I'm afraid you will be unlucky but until then, we would love to hear from you.

If you have a comment or idea for Computer & Video Games we would like to hear from you.

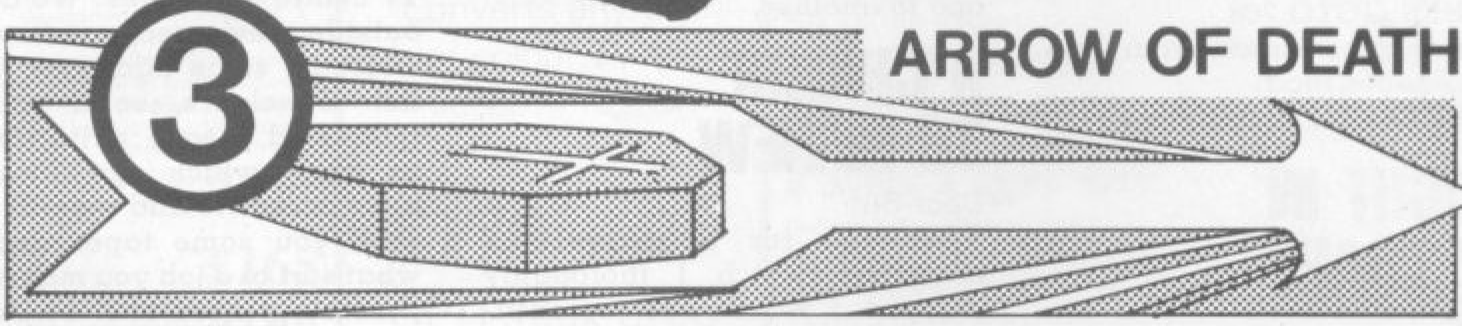
Please drop us a line at: Computer & Video Games, EMAP, Durrant House, 8, Herbal Hill, London EC1R 5JD. While we will respect requests for anonymity, names and addresses must be supplied.



INNOVATIVE
TRS 80-GENIE SOFTWARE
from the professionals
Mysterious Adventure







Three months ago we introduced the Mysterious Adventure series, a brand new series of machine language Adventures written by Brian Howarth. The first one, The Golden Baton, was greeted with enthusiasm by experienced and beginner Adventurers alike. Now the second and third in the series, The Time Machine and Arrow of Death, are available. The Arrow of Death, although entirely self-contained, is the first of a two part Adventure. The second part will be available early in the new year.

Mysterious Adventures are available for Models I and III TRS-80 and Models I and II Video Genie, both on tape (16K minimum) or disk (32K 1 disk minimum). A TRS-80 Model II version will be available shortly.

Any 1 Adventure:	On tape	£10.06	Any 2 Adventures:	On tape	£18.40
	On disk	£12.65		On disk	£23.00

All prices are inclusive of V.A.T. Please add 50p for P. & P.

MOLIMERX LTD
A J HARDING (MOLIMERX)

1 BUCKHURST ROAD, TOWN HALL SQUARE, BEXHILL-ON-SEA, EAST SUSSEX.

AMERICAN EXPRESS Cards Welcome

BARCLAYCARD VISA

Buy it with Access

TEL: [0424] 220391/223636 TELEX 86736 SOTEX G

TRS-80 & VIDEO GENIE SOFTWARE CATALOGUE £1.00 **[refundable]** plus 50p postage.

Circle No. 104

ARE YOU KEEPING THE ALIENS AT BAY?

Do space invaders fight each-other to avoid duty on machines which you're playing?

If so, then why let your reputation rest on those cold distant planets inhabited by the green meanies, let your own world into the secret.

In conjunction with Taito Electronics we are searching for the fastest, deadliest arcade player this side of Alpha Centuri. No matter which game you excel at, you are eligible to enter and it's very easy to do so.

Just turn to the reader reply card, which you will find inside our back cover and fill it in. There are some questions to be answered on what you are looking for in arcade games, so that we can tell the manufacturers and help you to get the kind of games you want.

Next fill in the name of the machine which you have accumulated all that expensively won expertise and take the card down to your local pub, club or arcade. Put the best score you can on the machine and ask the pub or arcade owner to sign it and send it off to us.

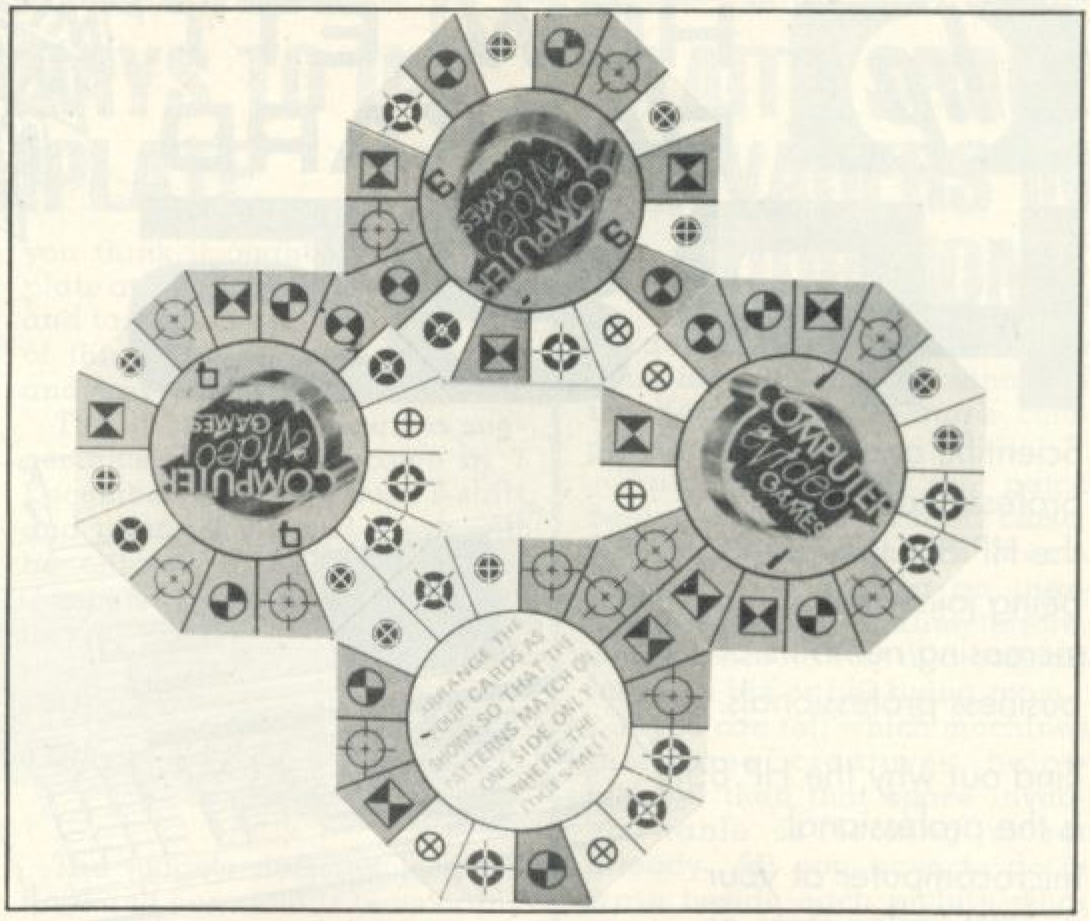
Should you find yourself finishing with a score which is not up to your usual standard, simply try again.

If, after you have sent the card in, you manage an even higher score, don't worry, you'll find another card and another chance to enter in our January issue.

We will keep a running chart on the scores on the 10 most popular arcade games which will be published in our Arcade Games section to give the rest of you something to aim at.

And the three top scorers on the three most popular machines who send us back their entry forms by 1 January will be invited along to take part in our Grand Arcade Game final.

So if you are the only human still keeping the multifarious hordes of space still locked inside their machines and off the streets of Britain, then let the world know who they owe their thanks to.



HERE IT IS SOLVED AT LAST!

Here it is ... the free first issue puzzle as you might have despaired of seeing it, solved!

Although judging by the amount of letters and phone calls we had, many of you have already managed to match the four cards as shown above.

Times for the puzzle ranged from an impossibly "lucky" 30 seconds to a couple of hours slogging through mathematical formulae. Many of you proudly claimed that you produced a solution without the use of a computer.

Our congratulations go out to all of you who managed to do what we in the office couldn't, but I'm afraid that there are still only three VIC-20 computers up for grabs and these will go to the best programs we receive to solve the puzzle.

But it's not too late for you to enter, the closing date is 13 December when all the entries will go forward to be tested against one-another by our judges.

Next issue we will be printing our program solution for those of you who could not work out how to start.

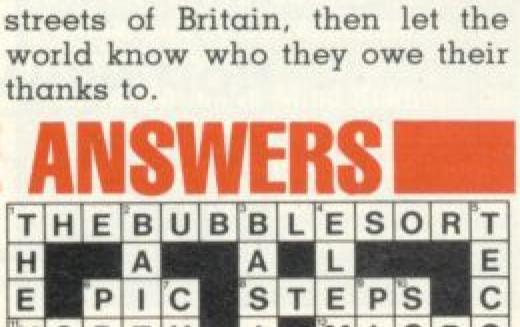
And if you were one of the many who complained that you do not yet have a computer and so were unable to enter, then turn to page 11 where you will find the all-too-easy-to-enter Great Template Competition.

BRAINWARE ANSWERS

Mercury, Venus and Mars will be the first three planets in line with the sun in our Mind Routines problem. And this astronomical wonder will take place in some 7,341,802.4870886 days (correct to seven decimal places).

The solution to Nevera's Crossword is printed right. We will print the names of the winners next issue.

This month's Brainware problems are on page 20.



TEN WINNING WAYS TO USE OUR TEMPLATE

You are now the proud owner of a *Computer & Video Games* free template and are probably wondering just what miracles can be performed with it.

The quick-witted among you will probably already have noticed that the edges on the template are ruler-sharp. Some of you might possibly have gleaned the information that when it is linked up along the bottom of a *C&VG* page, it reaches from one edge to the other.

The reasons for this may soon become clear . . . long ago, when this publication was a barely suppressed gleam in our publisher's eye, he pondered long and hard over the problems of keying in computer listings.

Realising the difficulties of keeping one's place in a long listing, he decided that what the public was crying out for was a tool — a carefully designed precision instrument to help with the keying-in process. He came up with the very template that was attached to your magazine's front cover.

So **we** want you to use the template to key-in our program listings. **You** might have come up with some other more imaginative uses for it. This is the essence of the Great Template Competition: we would like to know just what you would like to use our template for, whether you think it ought to be a template at all or who among the rich and famous could make best use of this 8" × 1" piece of plastic and why?

The 10 most imaginative suggestions which we receive by 7 December, will win a Bugs T-shirt and their names and ideas will be entered into the annals of *Computer & Video Games'* history.

ENTER THE GREAT TEMPLATE COMPETITION.
SUPER PRIZES TO BE WON!
SEE THE COMPETITION PAGE IN THIS ISSUE FOR DETAILS.



The judge's decision is quite final and her mind is reasonably unwarped — it might be worth bearing this in mind.

COMPETITION RULES

COMPUTER & VIDEO GAMES' many free competitions are open to anyone except EMAP employees and their relatives.

Entries to our Mind Routines, Nevera Crossword, Know Your Creature, Great Template Competition, Game of the Year and Arcade of the World competitions, should be sent to: COMPUTER & VIDEO GAMES, Durrant House, 8 Herbal Hill, London EC1R 5JB. Judges' decisions are final and no correspondence can be entered into.

Send entries to Mind Routines on a postcard and in all cases please include a name, address, and where possible, a phone number — so we can let you know should you have won.

TAITO SPACE INVADERS IN YOUR HOME

A Taito space invaders machine is up for grabs for the winner of the Know your Creatures competition.

Taito Electronics, the name behind the space invaders craze, will make one reader's dream come true — putting an inexhaustible supply of alien terrors, safely locked away in a cocktail table, in his or her living room.

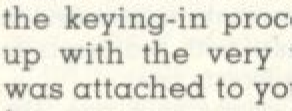
If you can tell which machines the three creatures below inhabit, then that space invaders table is looking closer already. All you have to do is write beside each picture what machine you think that particular creature features in. For example: if the first one looks like a Puckman, Pacman or Mazeman inhabitant, then write any of these words beside it and we will know what you mean.

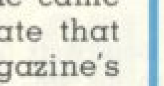
Then answer the question below, in not more than 25 words and cut out that part of the magazine, but do not post it yet. Put it with the three creatures we featured in our first issue and in our January magazine you will find the last three creatures to complete your set. When you have named all nine, send the three sections back to us.

This gives you time to hunt around your local arcade if there is a creature you are not sure of. The first correct answer out of the hat wins Taito's space invaders table.

And if you missed our first issue, then don't despair as we will be showing them again in that January issue.

KNOW YOUR CREATURES/2

 D ____________

 E ____________

 F ____________

Name ____________
Address ____________

Telephone: ____________

I THINK SPACE INVADERS PROVED SO POPULAR BECAUSE: ____________

For details of Computer & Video Games competition rules see page 9.

GAMES NEWS



THE NEW CHESS CHOICE

Chess enthusiasts, who opt for a computerised opponent are having an ever more difficult choice to make.

London based Westrak has a new medium priced chess game (it sells for £100) tempting buyers with a yen for a "full-sized chess board in an attractive brown plastic casing".

The chess board has a sensory surface with lights in each square which show when the computer wants to move. The player has to move its piece into the new position. It means you don't have to enter each move via a keyboard — just like playing a human, except you can set the skill level of your opponent.

Altogether there are 12 different levels, ranging from the learn mode, where the computer will help you along by suggesting a suitable move to make, to good club player standard.

If you make illegal moves the computer will also let you know by flashing it's lights at you. Lights also flash when the player's king is in check, and when checkmate is secured it will make another noise.

The game sells under the name Westrak CC1 and is available directly from the firm which is based in North London.

A RANDOM ADVENTURE

THE DUNGEONS OF DEATH

Not only a random dungeon but random monsters await the intrepid adventurer who dares the Dungeons of Death.

Ten tortuous levels have to be braved in a 45 minute time limit to win through this graphically displayed adventure.

The adventurer must first barter with the dungeon master for his arrows — magic and the more usual wooden variety — his characteristics are then generated, he is armed and armoured and then sets off on the quest by loading the first level.

A list of strangely named monsters with a toughness rating in percentage terms is generated and should be memorised if you are not going to end up fighting something deadly after running from a pretty harmless creature.

Treasures are there for the taking to reward the bold adventurer.

The game is supplied by London-based Sharpsoft for the Sharp MZ-80K and costs £8.25.

Among the other new games from Sharpsoft is a logical, test for people who like a financial challenge. It is called Stockmarket "F" and involves amassing as many stocks and shares of the highest prices as possible.

Stockmarket "F" costs £5.85. VAT and postage are included in both games.

A BETTER BET FOR PUNTERS

HELTA SKELTA FLATS

Followers of the Turf will find the "Sport of Kings" lovingly reproduced in the horse-breeding and racing game of Helta Skelta Flats.

The aim of the game is to breed horses and then run these thoroughbreds in a race against rival horses, placing bets on them to win money.

It is similar to that popular board game Totopoly and a fascinating concept for the Sinclair ZX81, but in some ways it requires more work with pen and paper than with the keyboard.

The ZX81 acts as a random selector for most of the time, with the information being kept on forms which come with the games package. Two-six players can take part.

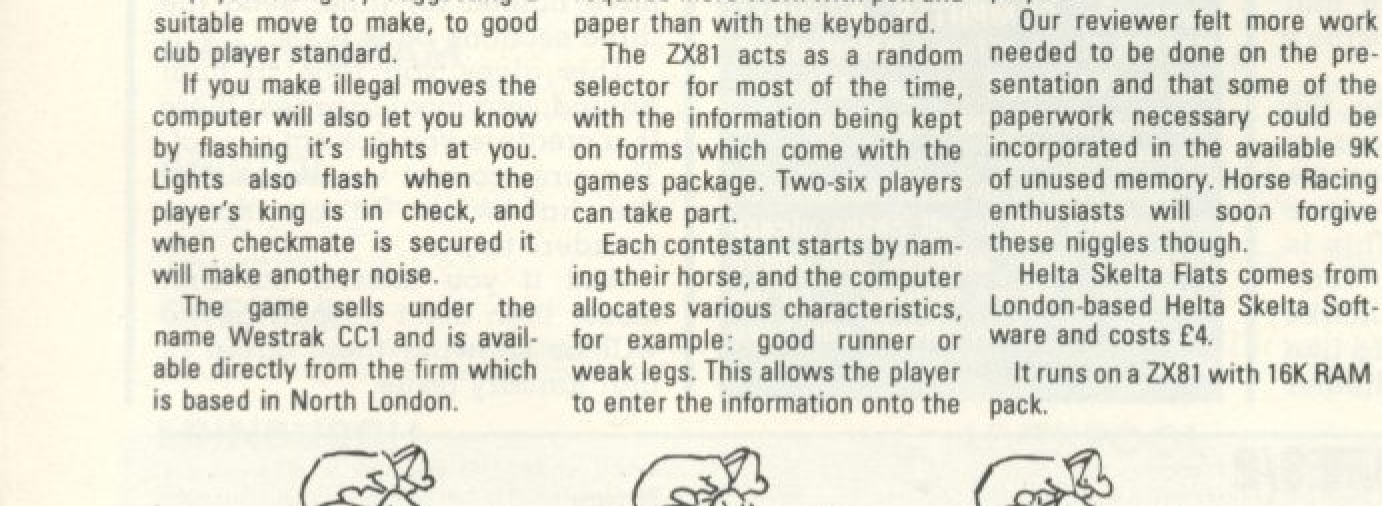
Each contestant starts by naming their horse, and the computer allocates various characteristics, for example: good runner or weak legs. This allows the player to enter the information onto the form card. Once this is done breeding can take place — for a fee. It should be possible for somebody who knows about these things to produce a winner.

Once interbreeding has taken place the race can begin. Odds are calculated by the computer depending on the form of each horse. Bets are also taken, with tote slips also provided in the package. The race is run and the winner collects from the other players.

Our reviewer felt more work needed to be done on the presentation and that some of the paperwork necessary could be incorporated in the available 9K of unused memory. Horse Racing enthusiasts will soon forgive these niggles though.

Helta Skelta Flats comes from London-based Helta Skelta Software and costs £4.

It runs on a ZX81 with 16K RAM pack.



A FEW POINTS TO MAKE

RHINO

A sorry fate awaits the computerised figure who walks innocently onto a field in Rhino.

He is faced by an animal of the same name with a hasty temper and a rather intimidating horn. The creature in question tends to take an instant dislike to anyone invading his field and has a few points to make on the subject.

Luckily there is a wooded area in the field and that is the poor unfortunate's only chance of escape. He must craftily entice the furious rhino into the trees and try to lose him there.

Even if he succeeds, the reward is not a pleasant one — with only a few seconds respite he wanders into another field to find himself with two beasts to lure to a foresty fate!

Rhino comes on a tape with another animal game called Wiggle. This time there is a smaller, but equally dangerous creature to contend with. The player has to guide a snake through the gaps in a set of parallel walls. But once that is mastered the game gets more difficult with the gaps getting more closely spaced.

These two games are for Acorn Atoms with 10K memory and require the floating point ROM. The cassette is priced at £5.00 from Liverpool-based Bug-Byte.

A second new cassette from the firm contains three games: Squares, in which you have to arrange letters in alphabetical order within a square; the musical memory game Simon; and Parachute which involves landing three parachutists on a platform. This also costs £5.00.

GAMES NEWS

WHERE THE ENDS ARE REALLY DEAD

MONSTER MAZE

Finding the way out of a maze is difficult enough without the hazard of man-eating monsters waiting to gobble you up if you cross their paths.

Running on the Commodore VIC-20, Monster Maze is an unusual game without a time limit and could be a big seller. The maze unfolds in five square sections as you walk through it, so you cannot see where you are headed — it could be a dead end.

At the beginning of each round a new maze is generated randomly so the player cannot get familiar with a particular one. He controls a man at one end of the maze using a joystick to follow the path moving up, down, right or left. As the player does not know the section he is walking into will be the correct path the game can be frustrating when you keep finding dead ends.

It sounds easy enough but not when a hairy monster is guarding the exit and moves towards you intent on killing you. He is a crafty beast and moves only as the crow flies, so he sometimes walks diagonally and has the nasty habit of hiding in the walls of the labyrinth — lying in wait to take the intrepid explorer unawares.

With each new maze the number of monsters increases, creating more hazards to negotiate. What you can do to thwart them, is lure the creatures away from the exit. You have to be clever to entice him towards you, making sure you can side-step him and quickly make your way to the exit.

Once you have reached round three with three monsters lurking in the maze for the next stage you are given a break with only one monster to contend with. For each round completed you score points.

This is one of the latest games for the VIC specially imported from the States by Adda Computers' VIC Centre. With one other game on the cassette it sells for £14.95.



THE KNIGHT'S DAY

DAMSEL AND THE BEAST

The age of chivalry and gallantry returns in the maiden-in distress game, Damsel and the Beast.

The player takes the part of our brave hero, sworn to save the wretched but vociferous damsel who is locked in the bowels of the wicked beast's castle.

A rather tongue-in-cheek adventure, this game sets its hero a randomly generated 35 rooms to search through to complete his task. The damsel must be found by working through these rooms, armed with clubs which can be used either to beat the beast, or smash down obstructing walls.

Only once the hero has slain the beast can he lead his thankful damsel to the exit.

To help light his path our knight is given a number of torches at the outset, which can be used to fend off the beast if he attacks. The tally of the clubs and torches is kept and displayed as each can only be used once.

Bug-Byte is the supplier of this adventure game and it is for use on a ZX81 with 16K RAM pad. The price £6.50.

BOLDLY GOING .... ON THE ZX81

STARTREK

Captain Kirk and Dr. Spock are ready once again to tackle the baddies of the furthest galaxies-but this time through the auspices of a Sinclair ZX81.

The 16K RAM pack gives ZX81 owners a Startrek game with more details and more facilities. It entails all the usual features of Startrek with the player in control of the Starship Enterprise, navigating it and Kirk's crew on a hazardous mission through space.

The Klingons are there in full force too, complete with super-fast firing lasers which the Enterprise has to avoid. She can defend herself with the special photon lasers she is equipped with. Startrek costs £5.00 from Bug-Byte of Liverpool.

WORKERS STRIKE IN ALIEN ACTION

APPLE PANIC

The space labourer is given a tough test of his workrate in the alien-bashing game of Apple Panic.

Any attempt to down tools from this worker of the future, results in death by devouring. The labourer is given a shovel and a network of ladders connecting various levels on the screen.

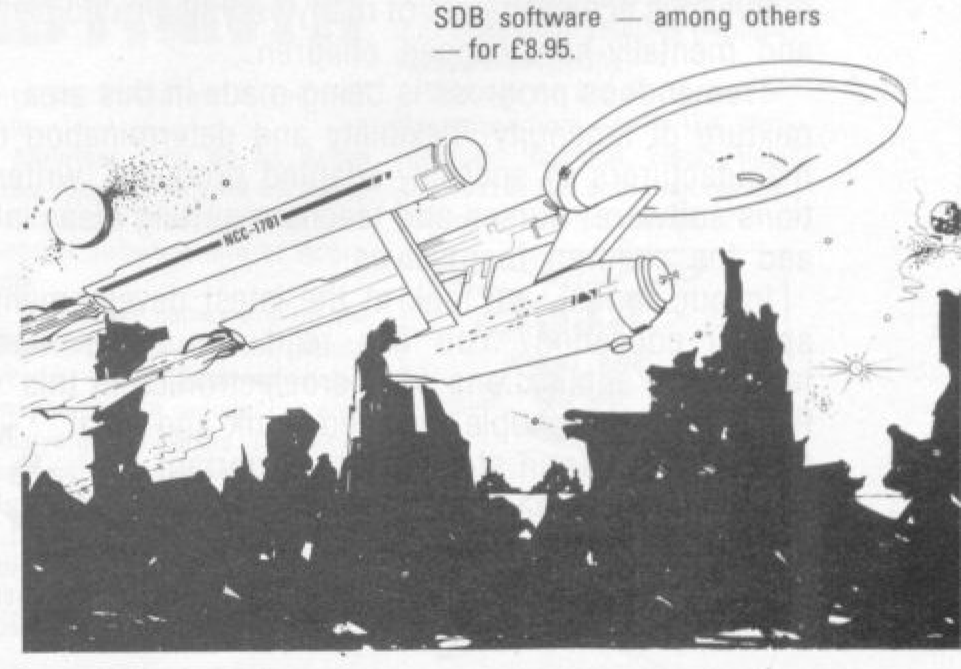
His task is to climb the ladders and dig holes which the Apple aliens will unwittingly fall down and hang from-suspended by their feelers. The workman then puts aside all thoughts of tea-break and rushes up to fill in the hole and send the creature plummetting to its death before it can climb to safety.

Five beasts inhabit the first "wall" and these can be killed by a fall of just one level.

The second screenful of creatures include a variety which can only be destroyed by digging two holes, one under the other, and sending him crashing down two levels.

If you succeed in bringing down this second creature, a third — needing a three levels fall to kill it — appears.

There are three lives to start off with, but bonus lives can be gained by the industrious. This time and motion studier's delight is available from Richmond-based SDB software — among others — for £8.95.



A special from Educational Computing

We can all help if we care enough



Many people regard computers as some form of man-made monster, heralding the advent of an era where machines are the masters of men. The emergence of microcomputers in the mid-seventies has helped to overcome this misguided view of how computers will affect our lives.

Each month, Educational Computing shows the tremendous advances being made in the enhancement of computers, particularly micros, as teaching aids. In this annual issue, ***Learning to cope – computers in special education,*** we look at the marvellous achievements of many very dedicated people working with disabled and mentally-handicapped children.

Tremendous progress is being made in this area, brought about by a mixture of ingenuity, flexibility and determination on behalf of the manufacturers of specially-adapted products, writers of applications software, nurses and teachers putting ideas into practice and the children themselves.

In our annual, we look at the latest developments in special education. You can read about the many fascinating applications of microelectronics in this field, what the people involved think and what the future holds in store. Most important of all, you can find if you can help — even in a small way.

Learning to cope — computers in special education £1.50

Please send me a copy of Learning to cope – computers in special education.
I enclose a cheque/postal order made payable to Educational Computing for £1.50 (including P & P).

Name

Position

Establishment

Address

Now please post to Learning to cope — computers in special education, 8 Herbal Hill, London EC1 5JB

Circle No. 106

GAMESNEWS

MOORE STARS ON YOUR T.V.

CONSTELLATION

A computerised rival to celebrity stargazer, Patrick Moore, can guide you through the night sky and its starry wonders.

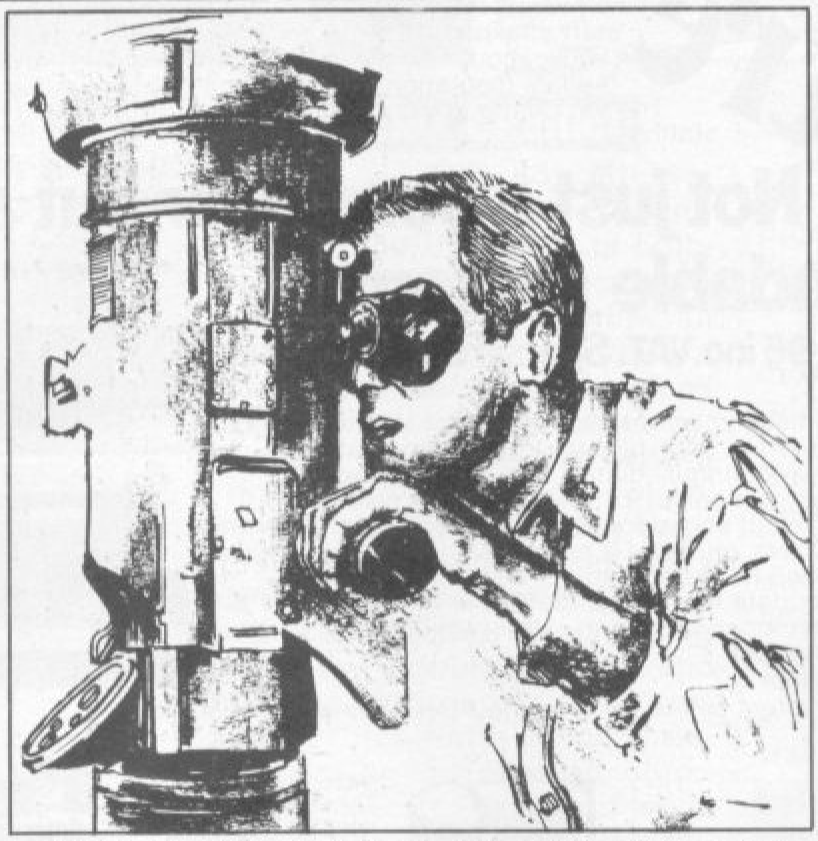
Constellation is the astronomy aid which will turn your television screen into the night sky — with the help of an Acorn Atom. The view you get on the screen is of the night sky as seen through the revealing lense of a telescope. Using this computerised guide it is possible to look at stars from any point in the northern hemisphere at any chosen time and date.

All the stars that appear on the screen can be shown by magnitude, constellation or number (supplied in a list with the cassette). Make use of the zoom facility to get a good close up of selected stars.

This program was written for a Nascom originally and has only just been converted for use on the Atom. Program Power of Leeds is behind this version which will cost astrology fanatics £7.

Another recent addition to Program Power's Atom list is Mazeball. The player's part in this game is to control a ball which bounces up and down the paths of a maze.

A variety of hazards crop up in your way which must be avoided by bouncing the ball out of their path. Mazeball retails for £4.95.



REBEL AGAINST AN EMPIRE

PROJECT NEBULA

The galaxy has been taken over by a force of ruthless, wicked aliens bent on suppressing the inhabitants.

A lone rebel leader with a spaceship is the only means of defence and the only hope of ridding the galaxy of the tyrannical invaders. The player takes control of the rebel and plans his strategy against the alien empire.

Project Nebula is the mission undertaken by the player to free the galaxy. In the Tandy TRS-80 colour computer game, there are four levels of skill, so the player can work his way through from inexperienced to advanced.

Special features of this new game include checking the fuel supply and refuelling and having to fly a disabled ship, damaged in an exchange of fire. Control is via a joystick.

From the Tandy Corporation Project Nebula costs £24.95, fairly expensive as games go but the new Tandy has colour graphics and the software is most up to date.

PLUMBING THE 3-D DEPTHS

SUBMARINE COMMANDER

For sheer atmosphere it is hard to beat a good submarine warfare game and the new one coming out for the Atari home computer has the graphics capabilities to really bring it to life.

Called Submarine Commander, it incorporates 3-D graphics. Realism is brought out with all the dials and gauges found in a real submarine, including: air pressure, oxygen, speed and depth readings.

And that atmospheric bleeping sonar, tracks your own vessel's path with a shadow indicator as well as revealing the presence of other enemy submarines in the area.

You can take the vessel into battle station mode and fire torpedoes at a chosen range and depth.

To add variety and realism to the submarine's simulation, the programmer who wrote the game for Atari has given the player three different views he can survey.

Firstly, there's the picture of the scene below and around the sub., so you can see hazardous objects and possibly creatures which might be lurking in your path. Then, there's the view of the submarine's position in relation to the land, and finally what is in sight when you look through that vital periscope.

This will be out at the end of November from Atari's U.K. distributors Ingersoll Electronics. The cost is £25 and a full review will follow in a future issue.

GOLD RAID ON THE LABYRINTH

MINOTAUR

Take a giant step with two hands full of gold and it might take you right into the jaws of a greedy minotaur.

He paces the labyrinths of a deep cavern guarding five valuable bars of gold which lie wrapped up inside a treasure chest. As soon as he senses an extra presence in his lair, he is on the alert and uses his automatic homing device to track down the intruder.

The only thing that will stop him moving towards the intruder are walls blocking his path but he will home in using a random direction to surprise the intruder.

The adventurer who dares wander into the minotaur's territory is armed with a specially-developed minotaur detector which warns him when the creature is five squares away. The higher the tone given out by the detector the nearer the creature is, warning the intrepid explorer to take evasive action.

Like any human the explorer can only carry two bars at once so he has to keep making trips back and forth until all five are securely locked up in the wall safe.

Minotaur runs on an Acorn Atom requires 5K with 6K graphics. It is the latest pack out from Acorn's software arm of Acornsoft.

Two other games are on the cassette, a version of the popular arcade game Puckman called Snapper, and a sadistic but compulsive game, Babies. The player must catch babies who are leaping for their lives from the top of a burning building. If the trampoline misses three babies, it marks the end of the game. It costs £10 plus V.A.T.

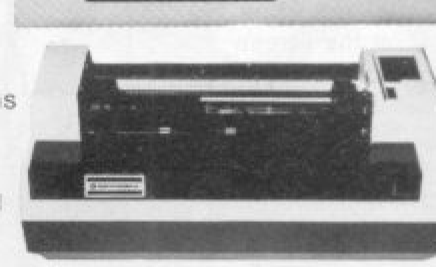


the vic centre

Adda Computers Ltd., a major supplier of computer systems to industry and business, have opened the Vic Centre in West London. Here you can see, discuss and buy everything to do with the new VIC 20 personal computer—in person or by mail. Hardware, software, technical advice and information is available from an experienced staff of experts. Even if you already own a VIC 20, get on our mailing list to know about new developments. Remember—everything has the backing of Adda's reputation, and there's a full 12-month warranty on all hardware. The Vic Centre is easy to reach—Just off the A40, close to North Acton tube station.

Not just a computer but a whole expandable system





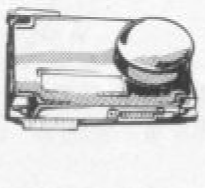
AT ONLY £189·95 inc. VAT. Special cassette deck £44·95 inc. VAT.

The VIC 20 is a fully-fledged, easy-to-use computer. It's the core of a great expandable system, with full-size keyboard operation. First-time users can work it immediately with plug-in program cartridges, using your own colour TV to get up to 24 colours on screen, and three different sound tones. Or write your own programs in BASIC. The VIC 20 lets you build a system as needs and budget dictate. You can expand its memory to 32k Byte with Plug-in modules, and transfer data to external storage units. So the VIC 20 is more than just a personal computer—and its system will expand to put it even further ahead.

VIC 20 Dot Matrix Printer
Tractor-feed, 80 character-per-line, 30 characters-per-second printer.
£229.95 incl VAT.

VIC-RS232 INTERFACE
Fully implemented (true levels)
RS232C-V24

BI-DIRECTIONAL INTERFACE
Allows Vic to work as Mainframe Terminal Drive a Qume Daisywheel or a Paper Tape Punch etc. etc.
FEATURE This unit contains master power supply which supports Vic's own supply when carrying Memory Expansions, Cassette Drives, Light Pens, Printers etc.



£56.35 incl VAT.

VIC-MEMORY 3K
Small size—low cost memory expansion. Plugs into Vic and reproduces memory-port. Can be used with other expansions gives a total of 6k user static ramon Vic.
FEATURE This board allows Vic to move Basic to begin at 1024 ($0400) as in Pet, and enables the use of HIGH RESOLUTION COLOUR GRAPHICS £40.25 incl VAT.



VIC-TOOL KIT £28.75 incl VAT.
For those who know tool kit on Pet we now have same facilities for Vic.
Renumber, Auto, Append etc.
This may be used with the stack VIC Rom Switch Board.



VIC ROM SWITCH BOARD £40.25 incl VAT.
An inexpensive unit which plugs direct on to Memory Expansion Port of the VIC and allows the insertion of up to 4 ROMS for games packs or toolkit aids, etc.
FEATURE. Simple software switch exchanges each pair of ROMS into VIC's ROM space allowing 'clashing' ROMS to be used.
FEATURE. Plug-in zero force sockets are available as optional extras to help eliminate pin damage to valuable ROMS.

VIC-LIGHT PEN
This high quality light pen works in both normal and Hi-Res modes on the Vic allowing simple interaction with the Vic without keyboard entry.
Easy to program and easy to use.
e.g. Menu selection. Non-keyboard entry. Teaching Games.
FEATURE touch sensitive "Enter" contacts to eliminate accidental entry.



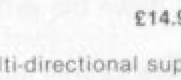
£28.75 incl VAT.

VIC-Games Port Adaptor Cable
games port plug.
A two into one adaptor for use with both joysticks and light pens. A must for those who require full control of games with graphics.
FEATURE low-cost High quality. Robust.



£14.95 incl VAT.

VIC JOYSTICK
Single
Hand-Held joystick units for games use available in Pair or Single configuration.
N.B. (2 Singles will not work as a pair unless modified)



£14.95 incl VAT.

Le Stick £30.75 incl VAT.
The ultimate joystick. One handed multi-directional super sensitive stick with built in fire button.

VIC software Each of these tapes **£14.95** incl VAT.

Codebreaker/Codemaker
You play the VIC or the VIC plays you in this computerised version of Mastermind.

VIC Seawolf, VIC Trap and Bounce-out
3 fun games, a submarine shoot out, a beat the VIC and an old favourite pub game. Good games with different skill levels.

Monster Maze and Maths Hurdler
A fun game with good colour and sound and a mental arithmetic learning game. Highly rated by everyone we have shown it to. Harder than you think.

TERMS AND CONDITIONS: All goods sold subject to Adda terms and conditions of sale. Full details available on request, but include: 7 day money back guarantee, Adda 12 month hardware warranty. Please allow 21days for delivery. Allow 7 days for personal cheques to be cleared. Quoted prices are inclusive of VAT.

Goods Required ______ Price ______

Add £2.00 p. & p. for orders under £50.00 Total £ ______

Name: ______

Address: ______

CVG2

MAIL ORDER to: Adda Computers Limited, FREEPOST, London, W13 0BR or telephone your order (24 hours a day) to 01-992 9904 quoting your BARCLAYCARD OR ACCESS number.

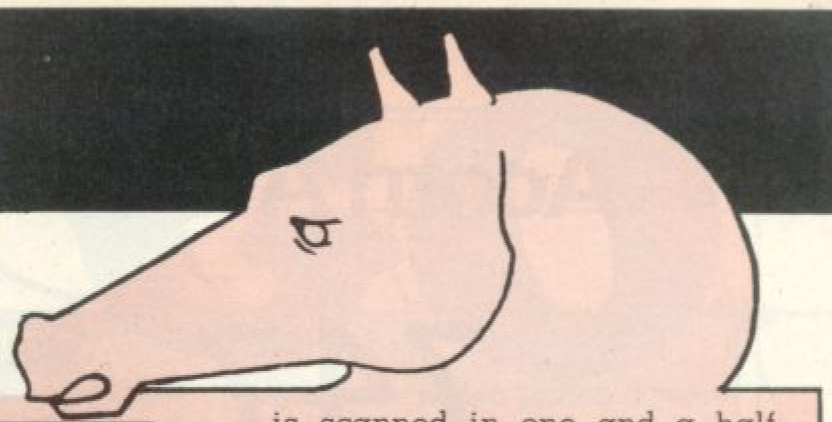
* I enclose a cheque, made payable to Adda Computers Limited for
£ ......
* Please charge my Barclay/Access account. My account number is
......
* Please add my name to your mailing list
* Delete as applicable
Date: ......

SHOP ADDRESS: Adda Computers Limited, 154 Victoria Road, Acton, London, W3. Tel 01-992 9904.
OPEN: 10 am—6 pm (Tuesday—Friday), 10 am—5 pm (Saturday).

adda

Circle No. 107

CHESS

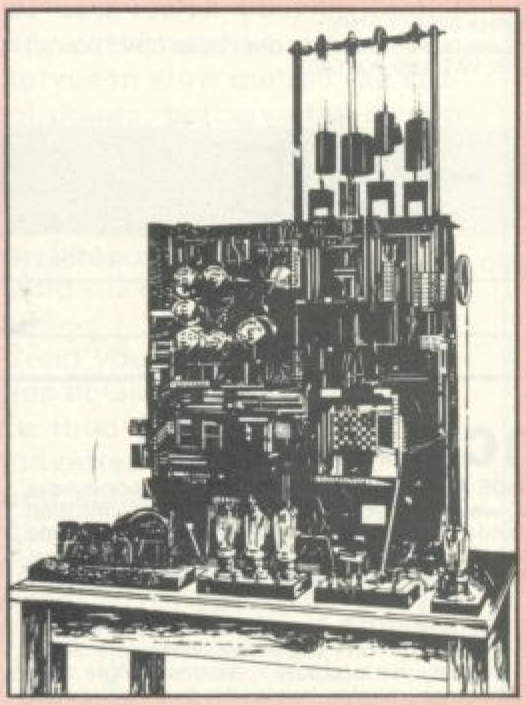


By Max Bramer

AFTER the hoax perpetrated in the mid 18th century by Von Kempelen's Chess-playing "automaton", the world had to wait until the end of the 19th Century for the genuine article.

The Spaniard, Leonardo Torres y Quevedo (1852-1936) was an early pioneer of dataprocessing and a prolific inventor. He built an electro-mechanical device to play the basic endgame of King and Rook against King.

The machine, which appeared in the 1890s, always played White (the stronger side) and



invariably forced checkmate, although frequently not in the smallest number of moves necessary.

Torres' principle motive for building the machine, was to disprove the argument that automation could never be used for tasks which required the "intervention of the mental faculties".

In 1975, Donald Michie, Professor of Machine Intelligence at the University of Edinburgh, published a reconstruction of Torres' algorithm in modern "decision table" form.

Michie states that in the worst case, it can take 62 moves for White to win (compared with a "theoretical" maximum of 16 needed from any starting position). White's play is painfully slow and tedious, as the reader will soon discover by choosing one or two starting positions and following through a "Torres strategy" for White in each one.

Producing an efficient algorithm remotely comparable to that of Torres in terms of compactness took almost 90 years further to achieve. The machine is now housed in the museum of the Polytechnic in Madrid.

Delegates at a conference on *Advances in Computer Chess* at Imperial College, London, in April were fascinated by a description by Ken Thompson (of Bell Laboratories) of his special-purpose chess machine named Belle.

Belle is an almost frightening example of the power of microchip technology. It can generate a candidate move for consideration in just over one two-millionth of a second and examines 160,000 positions per second. It uses a pre-stored opening "book" with 300,000 positions, compared with an estimated 200,000 positions in each volume of the *Encyclopedia of Chess Openings*. The entire book is scanned in one and a half seconds!

The speed with which this machine was developed is also incredible. The first "light" design was in February 1980, when the components (approximately 1,700 chips) were ordered. It played its first move in July, won a celebrated simultaneous game with Pfleger in Hamburg in August, won the third World Computer Chess Championship in Linz last autumn with a score of 4½/5 and has won several human tournaments since then.

Belle now has an official E.L.O. rating of 2140 and could well go much higher.

To dispel any feelings of overconfidence about the "state-of-the-art" of computer chess in the 1980s, here are the first few moves of two games from last years' first world microcomputer championship in London.

Black on both occasions was the aptly-named program, Albatross:
1. P-Q4, P-K3; 2. N-KB3, P-Q4;
3. N-B3, B-K2; 4. B-B4,Q-Q3??
1. P-Q4, P-K3; 2. N-KB3, P-Q4;
3. N-B3, B-K2; 4. P-K4, PXP;
5. NXP, Q-Q4; 6. N-B3, N-QB3??

I shall return to the subject of computer blunders next month.

Here is one of its recent games, an excellent win against a senior U.S. master, Mike Valvo.

White M. Valvo *Black* Belle
3.P-QN3, P-KN3; 4.B-N2, B-N2;
5.P-N3, O-O; 6.B-N2, N-B3;
7.O-O, P-N3; 8.P-K3, B-N2;
9.Q-K2, P-K3; 10. P-Q3, P-Q4;
11.QN-Q2, P-Q5; 12.P-K4, P-K4;
13.N-R4, B-KR3!; 14.P-KB4? PXP;
15.PXP, N-R4!; 16.Q-N4, BXP!;
17.RXB? N-K4; 18.Resigns

White loses the Rook and is then the exchange and a Pawn down in a hopeless position.

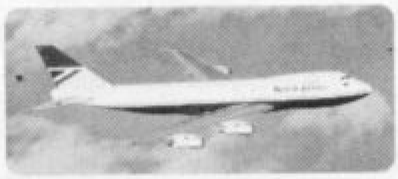
White's 13th move is dubious but Black's combination is surprising, and clearly foreseen on his 13th move (or 13 . . . B-KR3 is inexplicable). After 15 . . . N-R4, White cannot avoid losing material.

The black king					
is in the same zone as the rook	is not in the same zone as the rook and the vertical distance between the black king and the rook is				
	more than one square	one square, with the vertical distance between the two kings being			
		more than two squares	two squares, with the number of squares representing their horizontal distance apart being		
			odd	even	zero
The rook moves away horizontally (to the rook file of the other zone)	The rook moves down one square	The king moves down one square	The rook moves one square horizontally	The white king moves one square towards the black king	The rook moves down one square
1	2	3	4	5	6

Torres' algorithm, which divided the board into three zones of 3, 2 and 3 ranks.

Acorn Atom

747



FLIGHT SIMULATION PROGRAM FOR THE 12K ATOM

Written for Bug-byte by a 747 pilot. Accurate simulation of a 747's cockpit display (airspeed, altitude, rate of climb, attitude, flaps, etc., and graphic display of horizontal situation and attitude); allows you to guide your craft to the landing strip. On making your final approach the display changes to a high-resolution 3D representation of the runway coming up to meet you. A real test of skill. Finding the runway is quite a challenge — landing safely is even more difficult. If you succeed, you are awarded a skill rating and the chance to take off and try again.

REQUIRES FLOATING POINT ROM **PRICE ONLY £8.00**

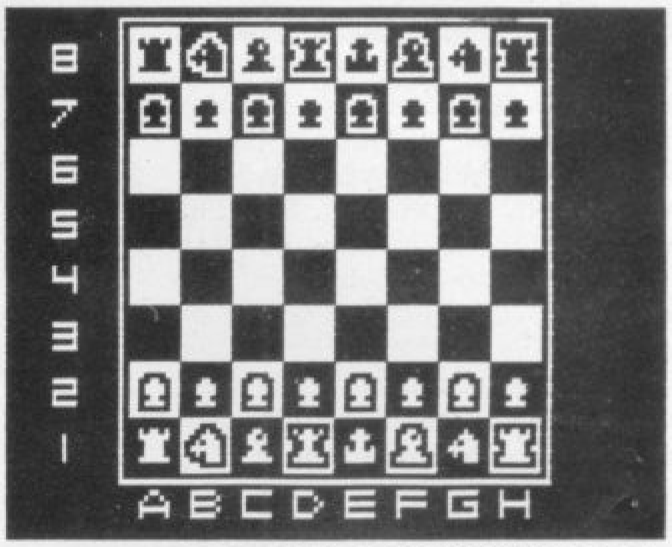
VISA

ALL PRICES INCLUSIVE
TELEPHONE 051 227 2642

BUG-BYTE

98-100 THE ALBANY OLD HALL STREET LIVERPOOL L3 9EP

Acorn Atom CHESS



THE PROGRAM YOU'VE BEEN WAITING FOR!

Fantastic machine code chess game for the 12K Atom. Features include: split screen (high res. + alphanumerics); many levels of play; casting and en passant; computer plays black or white.

Supplied on cassette with instructions. **PRICE ONLY £9.00.** DON'T FORGET — OUR PRICES INCLUDE VAT AND POSTAGE.

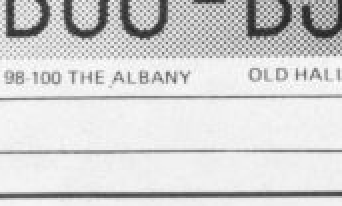
BUG-BYTE

98-100 THE ALBANY OLD HALL STREET LIVERPOOL L3 9EP

ACORN ATOM

ATOM INVADERS 12K, Gr. 4	£8.00
PINBALL 6K, Gr. 2	£4.50
ATOM BREAKOUT 4K, Gr. 1	£4.00
FRUIT MACHINE 8K, Gr. 2	£4.00
STAR TREK 12K, F.P.	£5.00
DISASSEMBLER 2K	£4.00
UFO BOMBER 7K	£4.00
LABYRINTH 12K, Gr. 2A, F.P.	£6.95
LUNAR LANDER 12K, Gr. 4	£5.50
BACKGAMMON 7K	£7.00
GOLF 7K, F.P.	£5.00
TYPIST 7K	£4.00
LAST RUN 7K	£3.00
WIGGLE + RHINO 10K	£5.00
SQUARES + SIMON + PARACHUTE 8K	£5.00
MINI-BREAKOUT + MINI-INVADERS 2K	£4.50
STATISTICS (4 programs) 12K	£20.00
2114L MEMORY CHIP	£2.00
C12 CASSETTE	£0.70

ORDER NOW FOR CHRISTMAS



THE ATOM: a bi-monthly magazine for Atom users, containing TESTED programs. Covers machine code and BASIC programming. 6 issues for only £4.50 inclusive.

BUG-BYTE

Sinclair ZX81

ZXAS MACHINE CODE ASSEMBLER Although many people have expressed disbelief, we assure you that this is a full-specification Z80 assembler. Standard mnemonics are written directly into your BASIC program. Code be assembled anywhere in memory. Handles labels. FOR 16K ZX81 & 8K ROM ZX80 — **A GIVEAWAY AT ONLY £3.95**

ZXDB DISASSEMBLER/DEBUGGER The perfect complement to ZXAS, giving you the power of very expensive computers. Apart from a full disassembler, the program contains Single step routines, string seach, block transfer, hex loader and many more. Can be held in memory at the same time as ZXAS, still leaving about 8K free. FOR 16K ZX81 & 8K ROM ZX80 — **ONLY £5.95**

MULTIFILE A multi-purpose menu-driven filing system supplied on cassette, together with 3 blank data cassettes and comprehensive documentation describing many applications. FOR 16K ZX81 & 8K ROM ZX80 — **NOW ONLY £12.50**

NEW RELEASES:—

STARTREK for 16K ZX81. All the usual features; 9 levels of play **ONLY £5.00**

THE DAMSEL AND THE BEAST A fantastic adventure game for the 16K ZX81 — one of the best 16K games available **ONLY £6.50**

ALL PRICES INCLUDE VAT & POSTAGE
24 Hour answering service
on 051 227 2642 for Access orders.

PLEASE SUPPLY: ....

I enclose a cheque/PO for £........ made payable to Bug-byte, OR debit my

Access card number ....

Signature ....

NAME ....

ADDRESS ....

....

BUG-BYTE: 98-100 THE ALBANY, OLD HALL STREET, LIVERPOOL L3 9EP

PROGRAM PACK 6 for the 16K ZX81 & 8K ROM ZX80

Two programs for the expanded ZX81 to keep you entertained for hours! 3-D OXO is written in machine code, and is hard to beat. The other is a compulsive adventure game called MARS RESCUE.

BOTH PROGRAMS FOR ONLY £4.50

BREAKOUT

This cassette contains two versions of the popular arcade game, both written in machine code, and both fitting into the 1K ZX81. Flicker-free fast moving graphics.

BOTH GAMES FOR ONLY £3.50

SOFTWARE

Circle No. 108

GO

By Allan Scarff

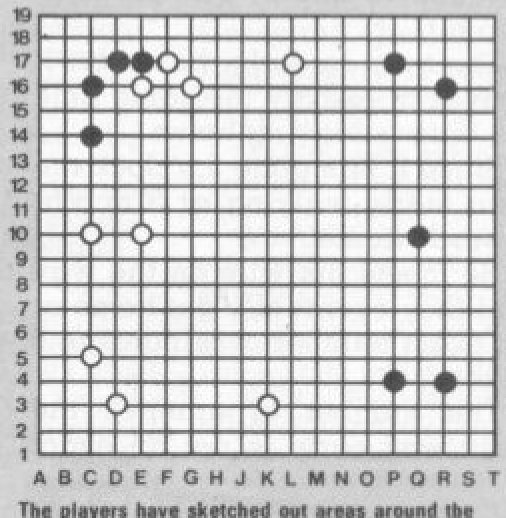
GO is the most popular board game in the world. If you haven't heard of it, that's because most Go is played in China, Japan and Korea. But Go is coming west fast.

In the UK, Go has found popularity with computer professionals, but it is the advent of the personal computer which offers the greatest opportunity to develop computer Go. Perhaps there already exist hundreds of Go programs? (If so, please write and tell me about yours!)

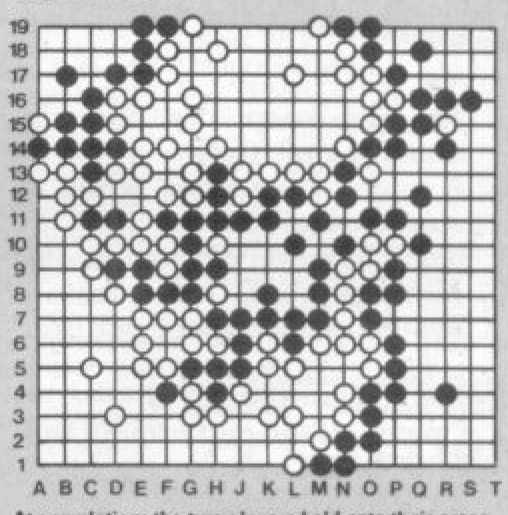
Go is, in essence, a very simple game. The playing pieces, called "stones", are black for one player and white for his/her opponent. Play consists of the contestants placing, in turns, a single stone on the intersections of a 19 × 19 grid. Each player attempts to surround territory; first sketching it out, then fighting to hold it and capture his opponent's areas, until the boundaries are completed. The winner is the contestant with the most territory and captive stones combined.

Go originated in China over 4,000 years ago, perhaps as a primitive abacus, but more likely as a method of divination. The board can represent the universe, the black and white stones the two universal elements, negative and positive, or yin and yang. In Japan as well as China, Go became very popular amongst warriors. It proved ideal for devising military tactics. Indeed, in more recent times the Vietcong included Go in their military training for officers (some would say to devastating effect!)

Its simple rules allow Go to be played in a simple fashion almost like the children's game, "boxes". Part of its charm is that in these circumstances the outcome is by no means predictable. But the game can be played at many levels of skill. At the higher levels, Go is revealed as the most subtle and profound board game of them all (including that modern upstart, Chess!).



The players have sketched out areas around the edges of the board.



At completion: the two players held onto their areas but black gained more territory than white (opponent stones behind enemy lines are captive).

GO affords many levels of programming challenge, from the very simple to the ultimate challenge — an intelligent program. It is possible to develop your Go program one step at a time, each step giving a useful program.

The first step is to use your V.D.U. screen as a board. The simple elements of the grid and circles for stones are relatively easy to represent.

Secondly, build in game recording and playback. No Go player should be without such a program! It can do for Go what video recording did for sport. You can relive your triumphs and catastrophes. You can analyse in slow motion the critical points, perceive the sweep of events by fast replay, even obtain an entirely different perspective by reversing the playback.

And all at the push of a button!

Next you should build in the rules of Go. Two novice players can then play without fear of inadvertent illegal moves. Captured stones should disappear automatically and illegal moves should be firmly rejected (with appropriate sound effects!)

Now you can include an evaluation routine to count territory not only when play has finished (enabling the program to announce the winner) but also during the game. The difficult part is getting the program to decide sensibly where the individual areas are, before they are completely formed.

The above four steps bring your Go program to the brink of taking on an active role as a player. Avoiding the distractions of adding more facilities for archiving, displaying and evaluating the game of Go, the next step is to include a crude move generator. One method is to use a random number generating routine to provide candidate moves. If the move turns out to be legal and does not decrease the computer's score (as determined by the territory evaluation routine), the program should accept the move. If not, it should generate another. Your program will now play Go . . . very, very badly! However, this in itself is valuable for a beginner — we all like to beat somebody! It's also interesting to see by how much you can win.

Improving the play of your Go program provides a fascinating study into the concepts of both Go and programming. Unlike Chess, nobody has ever been able to write a Go program that plays really well. What takes the machine an hour to calculate in Chess, would take a millennia in Go. There are just too many possibilities. Advances in programming Go will inevitably rely on new ideas, not on massive computing power. The micro is as suited to this task as the largest machine. Thus micro Go provides the ultimate programming challenge.

● Allan Scarff's next article, which explains the rules of Go and the first steps to "Micro" Go, will appear in our March issue. Next month Alan Hiron looks at programming Bridge.

Brainware



MIND ROUTINES



A man's wife normally drives to the station to meet her husband on the 5 p.m. train.

Her average speed in m.p.h., the time in minutes for her journey and the distance in miles from her home to the station are all whole numbers. (Her speed exceeds 15 m.p.h. but never 60 m.p.h.)

The train is early, however, it arrives at exactly the same time the wife is leaving home.

Since it has gone 5 o'clock the man starts walking at 3 m.p.h. towards home.

He meets his wife on the way and they eventually get home at an exact number of minutes to 6 o'clock.

The number of minutes the train was early is not an exact multiple of the number of minutes they were home early.

(1) How early was the train?

(2) And how far away did she live?

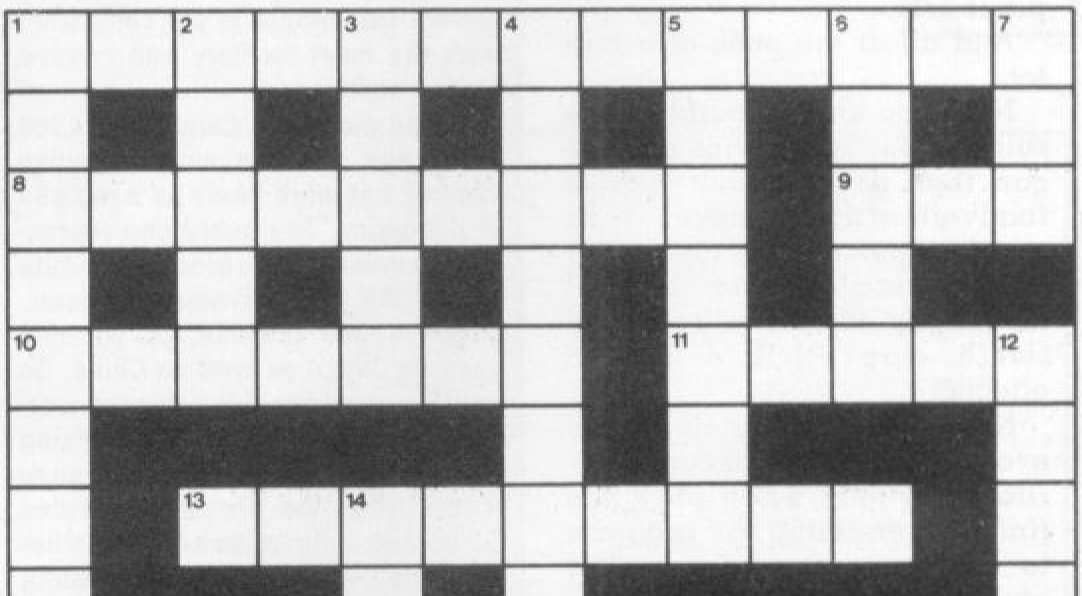
WIN OUR CHAMPAGNE

Two bottles of champagne are up for grabs on this page every month. The first correct answers out of the hat for both the Mind Routines problem and the crossword on 15 December will have bottles of champagne rushed to them. Ian Pedder's Mind Routines problem will test both your ability to think through a puzzle and set it out as a program. These lend themselves to solving by program. If you are more literary minded try Nevera's Crossword and see how you get on.

See page 9 for the solutions to the first issue's puzzle and crossword.

● For details of *Computer & Video Games* competition rules see page 11.

NEVERA CROSSWORD



Across

1. Do they keep 19's player's trousers up? (8, 5)
8. A micro often does when a sum is late. (9)
9. Basic function of the sun. (3)
10. Management Information System user of poor quality. (7)
11. Round number. (3, 2)
12. I'm put off the cuff around the PROM. (9)
15. 2 killed by Video. (5)
17. Allay on apple case statement by removing 150 characters. (7)
20. The number system Capone left last month. (3)
21. A set theoreticians level of pay. (5, 4)
22. Just the number for a bubble sort. (8, 5)

Down

1. Language maker. (9)
2. Basic star. (5)
3. Commands the syntax of a programming language. (5)
4. Mathematical Insertion into plate iron. (13)
5. End of the line from the micro. (3, 4)
6. Game in which to plot together. (5)
7. Evil Function. (3)
12. Step for a king in the hard stuff. (9)
14. Hardware result of 4. (7)
16. Non-alphanumeric character as above. (5)
18. Shut away the plotter won't draw with this. (3, 2)
19. A seaman — one who became a micro manufacturer. (5)
20. There's nothing loud when the machine's in this state. (3)

Make the most of your Sinclair ZX Computer...

Sinclair ZX software on cassette.

£3.95 per cassette.



The unprecedented popularity of the ZX Series of Sinclair Personal Computers has generated a large volume of programs written by users.

Sinclair has undertaken to publish the most elegant of these on pre-recorded cassettes. Each program is carefully vetted for interest and quality, and then grouped with other programs to form a single-subject cassette.

Each cassette costs £3.95 (including VAT and p&p) and comes complete with full instructions.

Although primarily designed for the Sinclair ZX81, many of the cassettes are suitable for running on a Sinclair ZX80 – if fitted with a replacement 8K BASIC ROM.

Some of the more elaborate programs can be run only on a Sinclair ZX Personal Computer augmented by a 16K-byte add-on RAM pack.

This RAM pack and the replacement ROM are described below. And the description of each cassette makes it clear what hardware is required.

8K BASIC ROM

The 8K BASIC ROM used in the ZX81 is available to ZX80 owners as a drop-in replacement chip. With the exception of animated graphics, all the advanced features of the ZX81 are now available on a ZX80 – including the ability to run much of the Sinclair ZX Software.

The ROM chip comes with a new keyboard template, which can be overlaid on the existing keyboard in minutes, and a new operating manual.

16K-BYTE RAM pack

The 16K-byte RAM pack provides 16-times more memory in one complete module. Compatible with the ZX81 *and* the ZX80, it can be used for program storage or as a database.

The RAM pack simply plugs into the existing expansion port on the rear of a Sinclair ZX Personal Computer.



Cassette 1 – Games

For ZX81 (and ZX80 with 8K BASIC ROM)

ORBIT – your space craft's mission is to pick up a very valuable cargo that's in orbit around a star.

SNIPER – you're surrounded by 40 of the enemy. How quickly can you spot and shoot them when they appear?

METEORS – your starship is cruising through space when you meet a meteor storm. How long can you dodge the deadly danger?

LIFE – J. H. Conway's 'Game of Life' has achieved tremendous popularity in the computing world. Study the life, death and evolution patterns of cells.

WOLFPACK – your naval destroyer is on a submarine hunt. The depth charges are armed, but must be fired with precision.

GOLF – what's your handicap? It's a tricky course but you control the strength of your shots.

Cassette 2 – Junior Education: 7-11-year-olds

For ZX81 with 16K RAM pack

CRASH – simple addition – with the added attraction of a car crash if you get it wrong.

MULTIPLY – long multiplication with five levels of difficulty. If the answer's wrong – the solution is explained.

TRAIN – multiplication tests against the computer. The winner's train reaches the station first.

FRACTIONS – fractions explained at three levels of difficulty. A ten-question test completes the program.

ADDSUB – addition and subtraction with three levels of difficulty. Again, wrong answers are followed by an explanation.

DIVISION – with five levels of difficulty. Mistakes are explained graphically, and a running score is displayed.

SPELLING – up to 500 words over five levels of difficulty. You can even change the words yourself.

Cassette 3 – Business and Household

For ZX81 (and ZX80 with 8K BASIC ROM) with 16K RAM pack

TELEPHONE – set up your own computerised telephone directory and address book. Changes, additions and deletions of up to 50 entries are easy.

NOTE PAD – a powerful, easy-to-run system for storing and retrieving everyday information. Use it as a diary, a catalogue, a reminder system, or a directory.

BANK ACCOUNT – a sophisticated financial recording system with comprehensive documentation. Use it at home to keep track of 'where the money goes,' and at work for expenses, departmental budgets, etc.

Cassette 4 – Games

For ZX81 (and ZX80 with 8K BASIC ROM) and 16K RAM pack

LUNAR LANDING – bring the lunar module down from orbit to a soft landing. You control attitude and orbital direction – but watch the fuel gauge! The screen displays your flight status – digitally and graphically.

TWENTYONE – a dice version of Blackjack.

COMBAT – you're on a suicide space mission. You have only 12 missiles but the aliens have unlimited strength. Can you take 12 of them with you?

SUBSTRIKE – on patrol, your frigate detects a pack of 10 enemy subs. Can you depth-charge them before they torpedo you?

CODEBREAKER – the computer thinks of a 4-digit number which you have to guess in up to 10 tries. The logical approach is best!

MAYDAY – in answer to a distress call, you've narrowed down the search area to 343 cubic kilometers of deep space. Can you find the astronaut before his life-support system fails in 10 hours time?

Cassette 5 – Junior Education: 9-11-year-olds

For ZX81 (and ZX80 with 8K BASIC ROM)

MATHS – tests arithmetic with three levels of difficulty, and gives your score out of 10.

BALANCE – tests understanding of levers/fulcrum theory with a series of graphic examples.

VOLUMES – 'yes' or 'no' answers from the computer to a series of cube volume calculations.

AVERAGES – what's the average height of your class? The average shoe size of your family? The average pocket money of your friends? The computer plots a bar chart, and distinguishes MEAN from MEDIAN.

BASES – convert from decimal (base 10) to other bases of your choice in the range 2 to 9.

TEMP – Volumes, temperatures – and their combinations.

How to order

Simply use the order form below, and either enclose a cheque or give us the number of your Access, Barclaycard or Trustcard account. Please allow 28 days for delivery. 14-day money-back option.

sinclair ZX SOFTWARE

Sinclair Research Ltd, 6 Kings Parade, Cambridge, Cambs., CB2 1SN. Tel: 0276 66104.

To: Sinclair Research, FREEPOST 7, Cambridge, CB2 1YY *Please print*

Please send me the items I have indicated below.

Qty	Code	Item	Item price	Total
	21	Cassette 1 – Games	£3.95	
	22	Cassette 2 – Junior Education	£3.95	
	23	Cassette 3 – Business and Household	£3.95	
	24	Cassette 4 – Games	£3.95	
	25	Cassette 5 – Junior Education	£3.95	
	17	*8K BASIC ROM for ZX80	£19.95	
	18	*16K RAM pack for ZX81 and ZX80	£49.95	
		*Post and packing (if applicable)	£2.95	
			Total £	

*Please add £2.95 to total order value **only** if ordering ROM and/or RAM.

I enclose a cheque/PO to Sinclair Research Ltd for £ ______

Please charge my Access*/Barclaycard/Trustcard no. ______

**Please delete as applicable.*

Name: Mr/Mrs/Miss ______

Address: ______

CVG12

puter-



Available now- the ZX Printer for only £49.95

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alphanumerics *and* highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further intructions.

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

And of course you can print out your results for permanent records or sending to a friend.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your computer – using a stackable connector so you *can* plug in a RAM pack as well. A roll of paper (65 ft long x 4 in wide) is supplied, along with full instructions.

16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

How to order your ZX81

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.

BY FREEPOST – use the no-stamp-needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research Ltd, FREEPOST 7, Cambridge, CB2 1YY. Order

Qty	Item	Code	Item price £	Total £
	Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor.	12	49.95	
	Ready-assembled Sinclair ZX81 Personal Computer(s). Price includes ZX81 BASIC manual and mains adaptor.	11	69.95	
	Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated).	10	8.95	
	16K-BYTE RAM pack.	18	49.95	
	Sinclair ZX Printer.	27	49.95	
	8K BASIC ROM to fit ZX80.	17	19.95	
	Post and Packing.			2.95

☐ Please tick if you require a VAT receipt TOTAL £______

*I enclose a cheque/postal order payable to Sinclair Research Ltd, for £______

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable. Please print.

Name: Mr/Mrs/Miss

Address:

FREEPOST – no stamp needed. CVG12

sinclair ZX81

6 Kings Parade, Cambridge, Cambs., CB2 1SN.
Tel: (0276) 66104 & 21282.

Circle No. 110

VIDEO SCREEN

SHOOT-OUT, CHESS AND DRAUGHTS

Perfect your marksmanship in a shoot out to the death in the desert sands of the wild west.

That's the theme of one of the new games for the Acetronic MPU1000 home video games centre. Either play against the computer or take on a friend or foe in this captivating game called Shoot Out.

The tension and excitement of those lawless days of gunfights are all there for £14.95. You take the part of one of the cowboys on the screen, who is in a gunfight and must save his skin by being quick off the draw.

Two other additions for the Acetronic range include chess and draughts which follow the format of traditional computerised games and sell for the same price as Shoot Out. Chess and draughts are available direct from Ace or through the firm's distributors in the UK.



WHAT A GRAPHIC KNOCK-OUT

BOXING



Landing a K.O. blow in the boxing ring is an exhilaration few of us will ever know but it is possible to relive some of the cut-and-thrust of the sport in the new Intellivision cartridge.

Boxing is now added to the long list of Intellivision sports cartridges which show off the machine's graphic qualities to best effect.

It's "seconds out" as you control one of the boxers fighting for survival in a tournament match. A clock on the platform stage in the righthand section of the screen ticks off the seconds of each round and the entire picture is dealt with in the usual perspective.

As with most of the Intellivision games arms and legs bend in the right places so the figures appear to be really moving and not as if they are suffering from a severe case of arthritis of the joints.

Points are scored for every blow each of the players strike and penalties given for below-the-belt punches. The winner is the player with the most points at the end of a bout or a win from a knock-out.

Boxing is available from the Intellivision Major League Sports Network range through UK distributors Ace (Advanced Consumer Electronics) of Wembley. Its retail price is marked at £18.95.

Space Armada is of the space invader version for the Intellivision. It has some graphically interesting aliens and costs £18.95. Otherwise the tactics are in the time-honoured tradition.

NO TIME TO HANG AROUND

DRAG RACING AND LASER BLAST

There's no time to hang around in the sport of Drag Racing and if you like your thrills short and sharp, you should enjoy the new television version.

When the game is mastered, a race can take as little as six to seven seconds — and from then on it's just a question of how many .01s of a second you can shave off your best time.

Mastering this cartridge is a real test of reactions and understanding. Two cars wait on a screen, revving away as the starter counts down from 10. As he reaches "one" it's both fingers on the accelerator button and a swift change into first gear, second, third and fourth, follow swiftly with perfect changes taking place that split second before the red revs line moves into blow-out mode.

It can make frustrating learning as itchy fingers push too early or too long in the search for a good time. The sound effects are convincing but the graphics are all too ordinary and capture none of the thrills and colour of the real thing.

The cartridge is produced for the Atari by US firm Activision and distributed over here by Computer Games for £16.95.

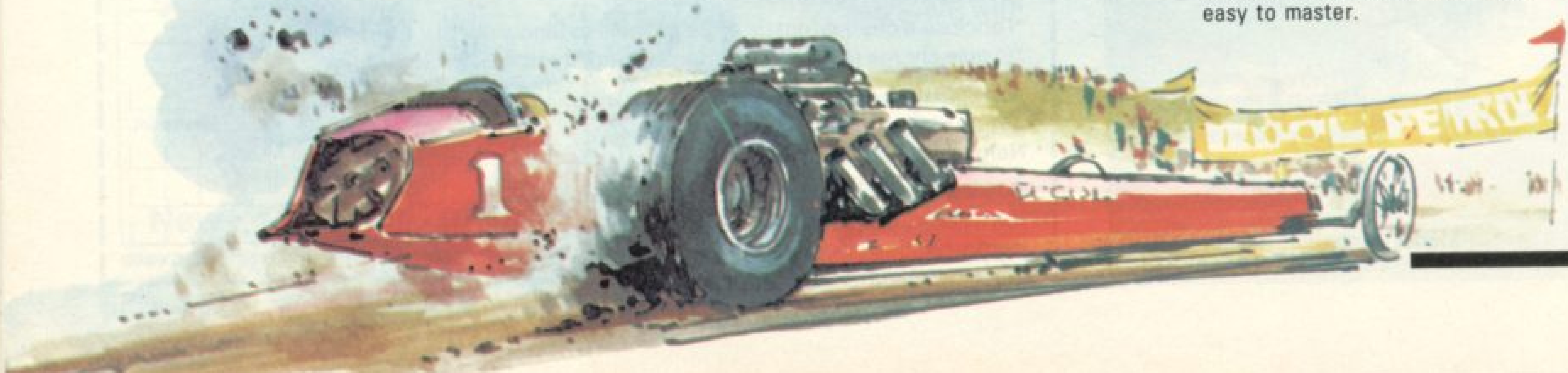
Also new out from Activision is Laser Blast, the game which reverses the usual alien descending from the heavens role.

Satisfyingly brilliant laser flashes illuminate the night sky as you guide your fleet of flying saucers over the planet's defences.

The defences come in threes. They roll along the ground beneath your ships and home in swiftly with their deadly fire.

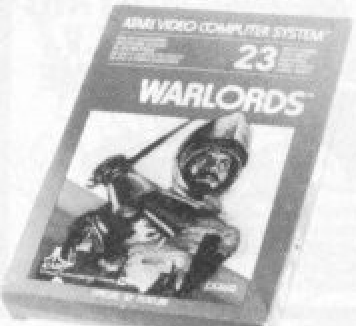
Shots from your own saucer are just as lethal as you soar above the ground forces — unfortunately, at just the height to give them the best chance of hitting you. When all three laser stations have been destroyed, the next three roll on to the screen. You have just three reserves to call on but have the additional advantage of being able to pilot your wrecked ship on to the defenders. Further reinforcements are available with each score of 10,000 and after some initial low scores, a dedicated player can reach this score for the loss of each life — and so keep going ad-infinitum.

Four skill levels and an asking price of £16.95 but perhaps too easy to master.



WHEN BARONS SQUABBLE

WARLORDS



In feudal times the all-powerful barons ruled their fiefdoms from castle strongholds and any squabbles were resolved by seige using the most awesome weapons of the day — the catapulted firebomb.

This is the backdrop to the latest Atari T.V. video game centre cartridge called Warlord, which takes players back to those lawless days.

Four sons of King Frederick were banished because of their evil ways and from then on they were constantly at each others throats battling one another for dominance of a territory. The object of the game is to re-enact those battles and beat the other princes into submission.

The player takes the part of one of the four princes defending his castle and attacking his brothers'.

Using the paddle controller you manoeuvre the protective shields against the fire balls which bounce between the castles. They have to break down the walls of your castle before they can aim a shot at your warlord. A direct hit puts the castle out of the game.

It's the best of five games in which to conquer your rivals. The pack is written with three main variations, the number of players, the speed of the balls and the shields.

One to four players can play, or you can play doubles. The ball speed can be either fireball or lightning ball and the shield has a dual function. You can either use it to ricochet balls or you can use it to catch opponents balls and release them at high speed. This cartridge costs £23.95 from distributors, Ingersoll.

CAROLS FOR CHRISTMAS

MUSICAL MEMORY AND EARTH INVADERS

Musical Memory will give carol lovers an extra bit of seasonal flavour this Christmas.

There are 36 different notes for the musically gifted to play with, to either invent your own tunes or recreate old favourites — already written into the game's memory is that well known ditty, When the Saints Go Marching In.

If the key of the melody doesn't sound quite right, it and the speed, can be altered. The composer can see the music as he writes it on the five bar staves, making alterations and editing the tune as he goes along.



Adding an extra dimension to the game are a couple of variations including a version of the popular musical memory game, Simon with both four and six colour options.

This new addition to the Database T.V. game centre's software range costs £14 and is obtainable directly from the manufacturers, Voltmace, or from the firm's distributors.

An improved version of space invaders has also been brought out. The original version, called Alien Invasion, was said by Database users to be too slow and too easy to master. The renamed game, Earth Invasion is much faster. The waves of aliens increase their speed across the screen more quickly. Apart from the extra speed the game contains the same features, £14.

TUNING UP ON YOUR PHILIPS KEYBOARD

MUSICIAN

For the musical minded there is a new game out to teach you to tune in and play by ear.

Called Musician, the pack incorporates an overlay keyboard which is put on top of original keyboard to look like piano keys. It is out now for the Philips G7000 T.V. games centre.

Even if you know nothing about playing or writing music this cartridge will present no problems. The notes that you strike on the piano keyboard are displayed on the screen on bass and treble staves with the note's name written underneath. Simultaneously the sound of the note is played when you press the key. So you soon recognise the note and its correct pitch.

You can program in your own melodies and edit them if you dislike the final outcome. There are also record and playback facilities for you to check what tune you have written.

Coming with the Videopac is a full instruction leaflet telling you exactly what notes you can use to write a tune. It also contains tunes which you can program in if your creative/streak is lacking. Three of those included are Sur le Pont d'Avignon, Muss I'Denn and Limehouse Blues.

The Musician retails for double the usual price of Videopacs at about £25.

SHARPEN UP YOUR FLIPPER SKILLS

PINBALL

Pinball players can sharpen up their flipper skills at home before going out and impressing their local arcade users.

Database has just added this game to its list of cartridges available this Christmas. Pinball's rules are — faithful to most arcade games — the player striving to keep the ball in play for as long as possible to build up the highest score.

With eight different skill versions of Pinball on the cartridge it gives players of all capabilities a chance to have a go. In all variations you have five "balls" to play with but games can either be played with single or double flippers.

Four of the games are more difficult because they are faster and the difficulty increases when you pass the 200 points mark. Then the flippers get further and further apart leaving a larger gap for the ball to escape through.

No tilting and no cheating in this game! If you keep your finger constantly on the "fire" button so that the flippers are flying all the time, you will only decrease your score — quickly.

You can get hold of a Pinball cartridge directly from Hertfordshire-based Voltmace for £14.

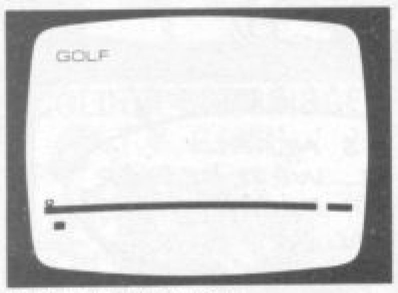


Circle No. 111

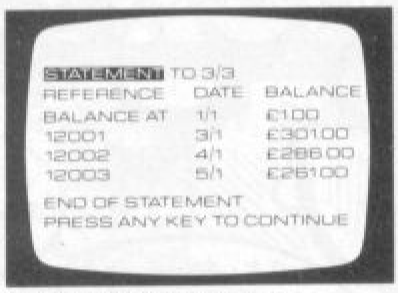


Circle No. 111

What would I do with a computer?



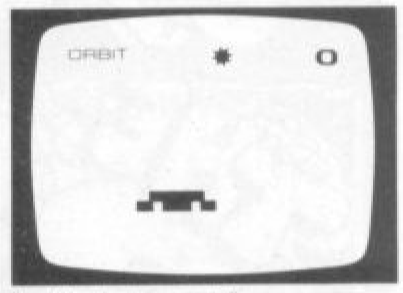
Play golf. Estimate your drive force on the fairway.



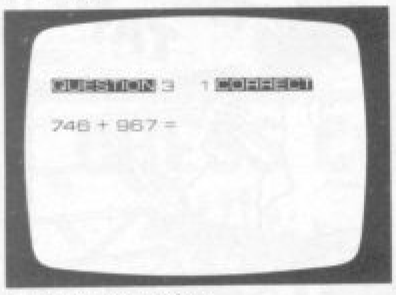
*Flummox your Bank Manager by keeping your finances at your finger tips.



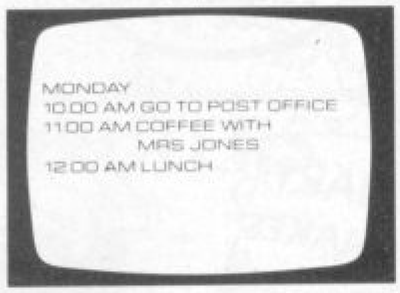
*Keep the rundown on friends, everything from their telephone numbers to birthdays.



Play Orbit and captain a spacecraft.



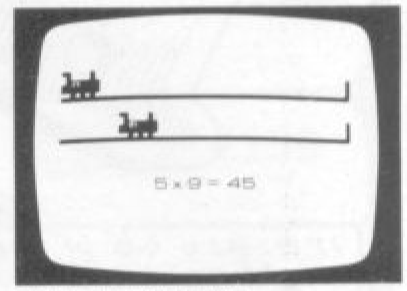
Teach the children maths from Division to Volume.



*Keep a diary of future appointments and past events.



*Catalogue all your collections from coins to stamps.



*Teach the children multiplication and play trains at the same time.



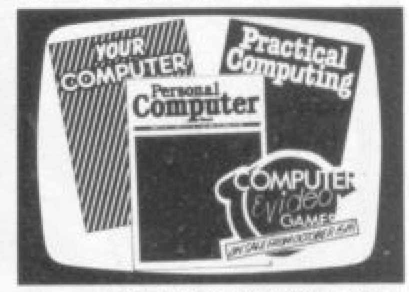
Or within a week you can write your own complex programs.



All you need to know for £14.95.



And a great range of books . . . .



. . . . and magazines to help you become an expert.

The first personal computer that only adds up to £69.95

16K RAM pack expands the memory capability by 16 times. £49.95.
*These programs require this unit.



You'll be surprised how much you can do with a personal computer and even more surprised at how little it costs.

We made it our business to find not only the best-value-for-money computer on the market, but also the best books to enable you to progress from a beginner to an advanced user. And W.H. Smith is the only retail chain where you can buy the incredible ZX81.

The Sinclair ZX81 is a masterpiece of design. Which is why it can carry out programs you'd normally expect from more expensive computers.

Although the ZX81 is fast and powerful, it's also simple to use. Within hours you can learn to run programs and within a week you could be writing your own complex programs. All you need is your own TV (any model that receives BBC2) and a cassette player when using pre-programmed cassettes. And W.H. Smith have a range available from £3.95 each.

So take your first steps in computing at W.H. Smith and make your life easier to run.

WHSMITH

Prices correct at time of going to press.

Available at these branches only:- Altrincham · Basildon · Bedford · Birkenhead · Birmingham · Bolton · Bournemouth · Bracknell · Bradford Broadway · Bradford Kirkgate · Brent Cross · Brighton · Bristol Broadmead · Bromley Burgess Hill · Burnley · Cambridge Lion Yard · Canterbury · Cardiff · Carlisle · Chatham · Chelmsford · Chester · Chichester · Chippenham · Colchester · Coventry · Crawley · Croydon · Darlington · Derby · Doncaster Ealing Broadway · Eastbourne · Edinburgh · Eltham · Exeter · Gloucester · Guildford · Hammersmith · Hanley · Harrogate · Hartlepool · Hemel Hempstead · Holborn Circus · Hull · Ilford · Ipswich · Kensington · Kidderminster King's Lynn · Kingsway · Leamington Spa · Leeds · Leicester · Letchworth · Lewisham · Lincoln · Liverpool · Loughborough · Lowestoft · Luton · Macclesfield · Maidenhead · Maidstone · Manchester · Middlesbrough Milton Keynes · Newcastle · Newton Abbot · Northampton · Norwich · Nottingham Listergate · Nottingham Victoria · Orpington · Oxford · Peterborough · Plymouth · Pontefract · Poole · Portsmouth · Putney · Reading · Richmond Romford · Salisbury · Sheffield · Slough · Solihull · Southampton · Southend · Stafford · Staines · Stevenage · Stockport · Stockton · Stratford East · Streatham · Sunderland · Sutton Coldfield · Swindon · Taunton · Telford · Watford Winchester · Woking · Wolverhampton · Wood Green · Woolwich · Worcester · Worthing · Wrexham · York.

Circle No. 112

Adventure

A swift glance down most software catalogues will reveal a veritable hoard of Adventure games.

They compete with Space Invader and Asteroid type games for the top-of-the-micro-pops. Which you prefer depends on whether you like to test your reactions and control, or are the mystery-loving puzzle-solver type (these are by no means mutually exclusive).

If you are new to Adventure and wondering which to try first, or if you are just wondering which to buy next, I will be helping to guide you through the Adventure jungle each issue. A brief rundown of what to expect from each Adventure, will help you select tapes and discs to suit your taste a little less randomly.

SCOTT Adams is the name behind a whole library of Adventures and his games have introduced many enthusiasts to micro adventuring. My own introduction was his Adventureland on a friend's machine. It is set in a swampy forest near a sunny meadow and progresses underground to a maze of pits.

Various things lying about the place seem rather innocuous, but as the game develops a feeling grows that most objects have a purpose, and that some very devious thinking will be needed to find uses for, among other things, an empty wine bladder and patches of oily slime! The large dragon, peacefully sleeping in the meadow, begs a good hard kick to wake him up — is he really as impervious to attack as he seems? And the "No Swimming" sign by the lake is positively urging you to take a dip — but with what consequences? The object of the game is to collect and store 13 treasures. To say more would be to give away too much.

So I'll merely say "Bunyon" and vibrate on to another Scott Adams' game — Pirate Adventure. A strong theme runs through this game which is littered with bottles of rum, treasure chests, anchors and a parrot, which is not only excessively greedy but very loquacious.

The story begins in the player's London flat, from where, after some chilling discoveries, it moves to Pirate Island. There it soon becomes apparent that you are being urged to do something without being told quite what.

Pirate is not as deep as Adventureland and the machine's memory is not so fully packed. But this is more than offset by a delightful sense of humour running through the game, climaxed by a cruel and dramatic hoax.

Both these games are available on the 16K TRS-80 and Video Genie; the 16K Exidy Sorcerer; 24K Apple 2 and Apple 2 Plus.

The Adventure series by Scott Adams, currently comprises 10 games. All games are written in machine code and have a "save game" feature enabling the current state of the game to be recorded and reloaded later.

Each month I shall be bringing you tips on how to write an Adventure program in Basic. In order to do this you will require a machine with at least 8K RAM and capable of holding many string variables, arrays (single dimension will do). It will also need string manipulation statements like: MID$, LEFT$, RIGHT$, LEN, plus the ability to concatenate.

Having devised your plot and drawn a map the next step is to number the locations from zero, and draw up a table. For simplicity I have shown a five location map in Figure 1 and the corresponding table in Figure 2. All exits in the example are compass bearings, hence the exit column entry for location 0 shows "ES"—E(ast S(outh) leading to destinations in the corresponding positions of the destination column entry, of locations 1 and 2 respectively. If more than 10 locations were to be used, double figures would be needed in the destination column.

Type the contents of the table, omitting the number column, row by row into data statements. Part of your program will now look like this:

```
DIM L$(4), E$(4), D$(4)
For I = 0 TO 4: READ
  L$(I), E$(I), D$(I): NEXT
DATA COTTAGE, ES, 12, LANE,
  WS, 03, FOREST . . .
```

and your logical network is formed!

Putting aside sophisticated word decoding routines for the moment, we can test this network out with the following simple routine:

```
150 (clear screen): LN = 1: REM
    CURRENT LOCATION IS 1
160 PRINT "I AM IN A "; L$(LN)
170 INPUT "WHERE TO NOW";
    R$ (clear screen): REM ANS-
    WER N, S, E or W
180 R$ = LEFT$(R$, 1)
190 FOR I = 1 TO LEN(E$(LN) )
200 IF MID$ (E$ = VAL (MID$
    (D$(LN), I, 1) ): GOTO 160
210 NEXT
220 PRINT "I CAN'T GO THERE" :
    GOTO 160
```

To place objects in these locations is now quite easy. Make an object table as in Figure 3 using array P to hold the current location of each object. Read this in from data statements as with the locations. Now add these lines to those above, and Hey Presto!

```
165 OS$ = "I CAN SEE ": FOR I = 0
    to 3
166 IF P(I) = LN THEN OS$ =
    OS$ + O$(I)
167 NEXT: PRINT OS$
```

We can't manipulate the objects yet — that will come after we've had a look at word decoding next month.

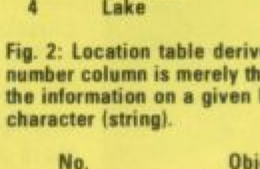


Fig. 1: Simplified network of locations showing initial positions of objects in brackets. Note: objects and locations independently numbered.

No.	Location (Array L$ (4))	Exits E$ (4)	Destination D$ (4)
0	Cottage	ES	12
1	Lane	WS	03
2	Forest	NE	03
3	Meadow	NWS	124
4	Lake	N	3

Fig. 2: Location table derived from map in Fig. 1. The number column is merely the subscript used to access the information on a given line. Note all variables are character (string).

No.	Object Array O$ (3)	Place P(3)
0	Knife	0
1	Fish	4
2	Cow	3
3	Axe	2

Fig. 3: Object table derived from Fig. 1. Again the number column is the array subscript. Note that since array P will only hold the number of the current location of an object it may be defined as integer numeric.

BY KEITH CAMPBELL

ARCADE TIPS



ASTEROIDS DE LUXE

When the blown up asteroid sent out three arrow-head missiles on that first revenge mission, many players decided that Asteroids de Luxe was too hot for them.

A pity, because good use of the faster firing and moving advantages of the second generation Asteroids game, could still ensure a long play. And the new features make for a more entertaining play, than that offered by its popular predecessor. Here we tell the uninitiated what to expect from Asteroids de Luxe and offer a few hints on survival.

The first difference from the original game is that there are more meteors on the first screen, seven instead of four. But you will soon find that the faster firing button — it is possible to fire almost continuously — makes for more dramatic destruction.

This fire-power makes it easy to stand your ground when meteors are heading straight for you, as you should reduce them to smithereens before they become a real danger.

There is also the question of the shields. These are an improvement on the hyperspace panic button of the original, because there is no random luck element involved. However, timing is all important. New players tend to press the shields too early and waste this far from inexhaustible means of defence.

The U.F.O.s are a very different proposition in de Luxe. The small one is usually on patrol early and is far more deadly, hitting stationary targets with ease and also picking you off if you move in a straight line. So weave!

No point in leaving that last rock and waiting in a corner to build up a high score in this version either. The small U.F.O. responds by blowing up that last rock with its first shot and your ship normally follows soon after.

When the "geometric" asteroids begin appearing it is best to leave them until you have room to manoeuvre. when these are hit, three homing missiles are loosed upon you and fire and run tactics are the best way to reduce the threat of these splitting horrors.

As in the earlier Asteroid version, the best players learn how to use the thrust and keep on the move.



ROYAL SNATCH AND GRAB

It's back in time, for once, in the King and Balloon aerial defence game.

Instead of the usual space invaders and laser bases, this game features balloons which descend from the heavens and crossbows.

The balloons are the villains of the piece, attacking in squadrons of 42 which will stretch your more primitive resources to their limits.

You play the part of a faithful marksman employed to defend the royalty of the castle from the aerial kidnappers.

Should the invaders snatch your monarch, he proves quite vocal, crying for aid from his retainer and a well aimed shot which downs the capturing balloon will enable him to parachute to safety murmuring his thanks.

When a squadron of balloons is downed by the crossbow a faster-moving one appears to attempt the next snatch and grab raid.

And should that royal figure disappear over the horizon, dangling captive from his basket, it's a case of: "The king is dead! Long live the king", as another is sent out to tempt the balloons back.

Up to three kings can be lost before the game is over.

A fun variation on the usual theme which is not too demanding graphically but still challenging.

STREET TALK

A brief rundown of machine slang: phrases and comments which players use while blowing up asteroids.

- Reggae rattle — a phrase to describe the constantly on the move player.
- Orgy of destruction — keeping up a constant stream of fire in an attempt to wear down the meteors.
- A bouncer — a player who makes good use of his shields.
- Bad boulder — a meteorite which will unleash missiles when blown up.

As far as we can tell there are no noticeable programming bugs in Asteroids de Luxe.

- Next issue we look at the popular but tactically difficult arcade game of Defender.

GOLF: NOT JUST FOR THE CLUBS

Japan goes in for crazes with such gusto that our flirtation with Rubik's Cube seems half-hearted by comparison.

So Pro Golf, which combined the crazes of golf and video games (two of Japan's biggest) was bound to be a hit over in the Orient.

But our own arcade industry is pessimistic about this graphically superb game finding a following over here. The game is certainly a far cry from the usual space-fodder fare to be found in pubs and arcades but it could worm its way into western hearts.

A nine hole golf course is to be played. Choose your club, address the ball and hit, before the golfer takes his fifth automatic swing, or you will lose your ball.

A limited number of balls are allowed per hole and if that is passed a golfer will also be lost. Trees, ponds, bunkers and out-of-bounds areas add to the difficulty. Each hole has its own par score and holes in one are possible.

A game which deserves to see a wider audience than just the "19th holes" of the golf clubs.

ACTION

KING KONG GOES CRAZY IN A CABINET

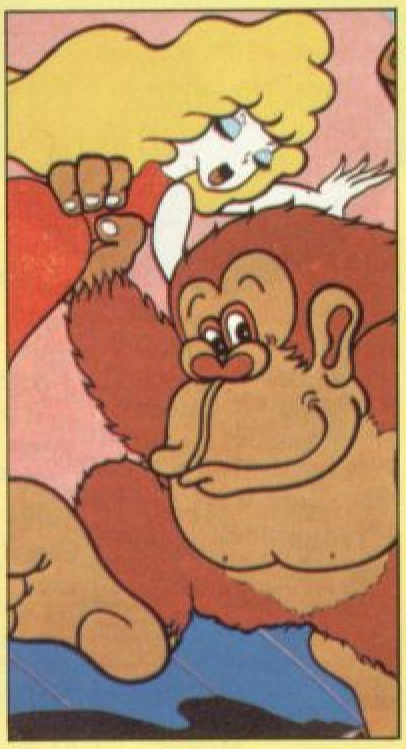
The box-office success, King Kong, now looks likely to become a success in a box — or at least an arcade cabinet — in the game Donkey Kong.

Kong has captured an electronic starlet and is holding her hostage at the top of the screen. He hurls down barrels at the rather unheroic rescue figure as he rushes up a series of tilting levels. The rescuer must leap over the oncoming barrels and so make his way to Kong's hideout. A hammer with which to knock the barrels clear of the level, can be reached by a well-timed leap skywards.

Once at the top, Kong realising he is beaten, picks up our heroine and carts her off to a new screen. here the rescuer must leap between passing lifts to attain the giant chimp's hideout.

On achieving this, the screen changes again to a conveyor belt affair and so the chase continues, with Kong hurling obstacles in the path of our plucky hero until the girl is finally saved . . . then it all starts again only with more obstacles.

Can Jumpman save the wretched heroine? Find out down your local arcade.



AN AMPHIBIOUS ARCADIAN

The arcade games industry seems to have discovered a new hero figure to tempt us onto its machines.

It is questionable whether hard-bitten arcade and pub veterans, who are used to seeing themselves as laser bases or rocket ships, will be able to identify with this new character — a frog — but he seems to be cropping up in several games now.

Frogger is one of the popular new generation of arcade games which are getting away from space themes.

It does give an idea of how tough a life frogs may lead. Our intrepid amphibian is first set the problem of crossing a busy highway without getting run over.

Manoeuvring the creature by a joystick, either vertically or horizontally, it must avoid a steady stream of vehicles to reach the river bank. Here the aim is to cross without falling in, via a series of logs and the treacherous diving turtles, who are not averse to giving a hurrying frog an early bath.

Other terrors lurking here include deadly snakes, otters and crocodiles.

Points are scored for each safe jump (10), arriving safely home (50) and beating the timer (10 points per beat saved). Bonuses can be accrued by escorting home a lady frog (200), gobbling an insect (200) and safely getting all five frogs home (1,000).

ALIENS ABOVE THE SKYLINE

Piloting your craft above a New York-like skyline gives you first taste of the Space Odyssey challenge — but the action does not stop there.

Space Odyssey is reminiscent of the Defender game but with a much less daunting array of buttons to become familiar with.

Just two buttons and a lever here. The buttons are simply "Fire" and "Bomb" and the lever gives you all the manoeuvrability you will need on the long voyage ahead of you.

Missiles are launched from the ground to prompt you forwards and a fleet of alien spacecraft speeds towards you. Firing to pick off those you can, while flying skifully to avoid the rest of the enemy craft and the tall buildings, you pick your way through the waves of attackers.

A regular feature of the early waves is the laser-firing Mothership Galactica, a large craft which appears initially to be indestructable but a little perseverance will prove otherwise. Later the action switches to a mountainous moonscape.

So the game progresses until you are speeding between large black holes which will draw you into their voids should you fly too close and leave you spinning and vulnerable to enemy fire. Then it is back to the opening sequence again.

The game is easy to learn, the action is always changing and the graphics and backdrops are among the best you will see. If you liked the idea of Defender but found it too difficult to master, Alca Electronics is distributing the game for you.

GALAXIANS MARK II

The second generation of Galaxians is on its way to our arcade skies.

This new breed, which beares the Midway logo, do not sit passively in the skies waiting to be shot at but swarm in from the sides of the screen to form their convoy and then dive groundwards to put your laser station out of action.

Apart from this peculiar behaviour, the new creatures resemble and attack in the same fashion as the already popular Galaxians. And the action will be just as frantic as before.

One other important change is the name, this new breed answer to the name of Galgas.



Chomp runs on a Sharp MZ-80K
By Karl Parker and Terry Brown

CHOMP

Arsenic and Old Lace's elderly poisoners probably played Chomp while waiting for their victims to tuck into their last supper.

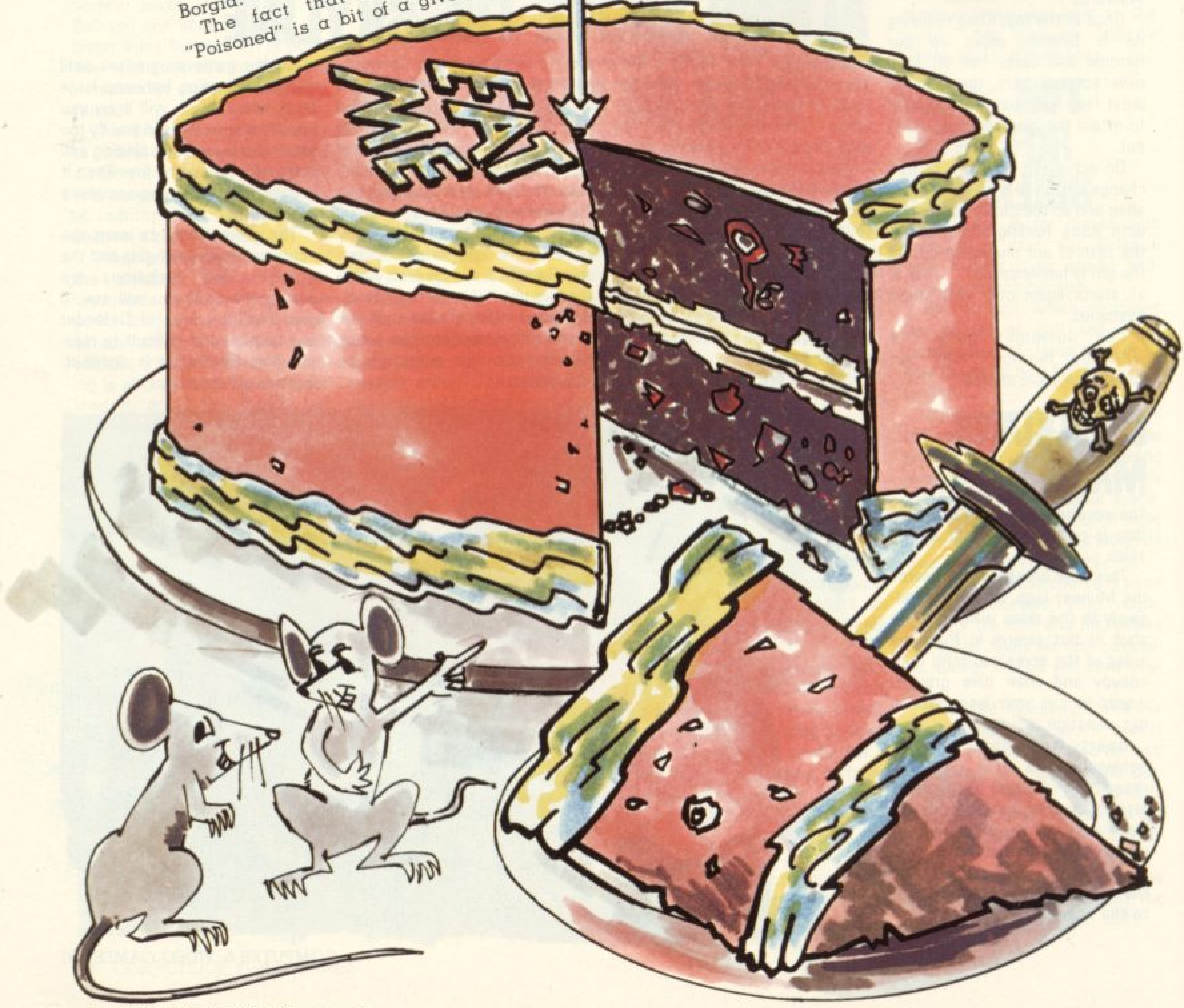
The supper prepared on the Sharp screen in this game is going to be somebody's last too. The screen is set out like a large piece of cake but the piece in the top right hand corner could have been made by Lucrezia Borgia.

The fact that it is labelled "Poisoned" is a bit of a giveaway.

But the cake has to be finished so someone is going to end up eating the piece which will give them more than heartburn! The players take it in turns to Chomp on a piece of cake and try to manoeuvre their opponents so as to force them to eat from that poisoned section.

This game makes good use of the Sharp's musical facility and includes a fitting end to the game when that fatal Chomping has taken place.

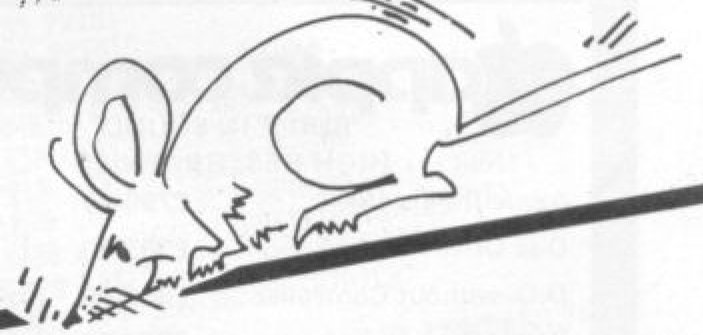
Not for the queasy!



P



```
5 DIM N$(10)
10 PRINT" "
20 PRINTTAB(15);:PRINT"C H O M P"
40 PRINTTAB(14);:PRINT"_________"
55 PRINT" The board is set out like a large piece"
65 PRINT" of cake,but the piece in the top right"
75 PRINT" hand corner is POISONED."
85 PRINT"       KILL your opponent by forcing him"
95 PRINT"    to take the poisoned section."
130 PRINT"      Choose the board size - up to 9x9"
150 PRINT"      The poisoned piece is shown as █"
160 PRINT"    ·edible pieces are displayed as █"
165 PRINT
190 PRINT"PRESS ANY KEY TO CARRY ON"
191 FOR A=1 TO 40:FOR B=255 TO 1 STEP -1:POKE4514,A:
     POKE4513,B:USR(68):NEXT
192 USR(71)
195 GETA$:IFA$=""THEN195
200 PRINT" "
280 DIM A(10,10)
290 PRINT" "
300 F=1
310 F=0
320 FOR I=1 TO 10
330 FOR J=1 TO 10
340 A(I,J)=0
350 NEXT J
360 NEXT I
380 PRINT"  "
390 INPUT"HOW MANY PLAYERS ";P
391 FOR F=1 TO P
393 INPUT"INPUT NAMES OF PLAYERS ";N$(F)
394 NEXT
400 I1=0
410 PRINT" "
420 INPUT"HOW MANY ROWS ";R
430 IF R<=9 THEN 480
440 PRINT" "
450 PRINT"The maximum amount of columns is 9"
460 GOTO 420
470 PRINT" "
480 PRINT" "
490 INPUT"HOW MANY COLUMNS ";C:PRINT" "
500 IF C<=9 THEN 540
510 PRINT" "
520 PRINT"The maximum amount of columns is 9"
530 GOTO 490
540 PRINT"    "
550 FOR I=1 TO R
560 FOR J=1 TO C
570 A(I,J)=1
580 NEXT J
590 NEXT I
600 A(1,1)=-1
610 PRINT"   ";
620 PRINT"1 2 3 4 5 6 7 8 9"
630 FOR I=1 TO R
640 PRINT I;
650 FOR J=1 TO C
660 IF A(I,J)=-1 THEN 700
670 IF A(I,J)=0 THEN 720
680 PRINT"█";:PRINT" ";
690 GOTO 710
700 PRINT"█";:PRINT" ";
710 NEXT J
720 PRINT
721 FOR E=0 TO 50
722 POKE4513,E:POKE 4514,E
723 USR(68)
724 NEXT E
725 PRINT
726 USR(71)
730 NEXT I
740 PRINT
750 IF F=0 THEN 770
770 LET I1=I1+1
780 LET P1=I1-INT(I1/P)*P
790 IF P1<>0 THEN 810
```



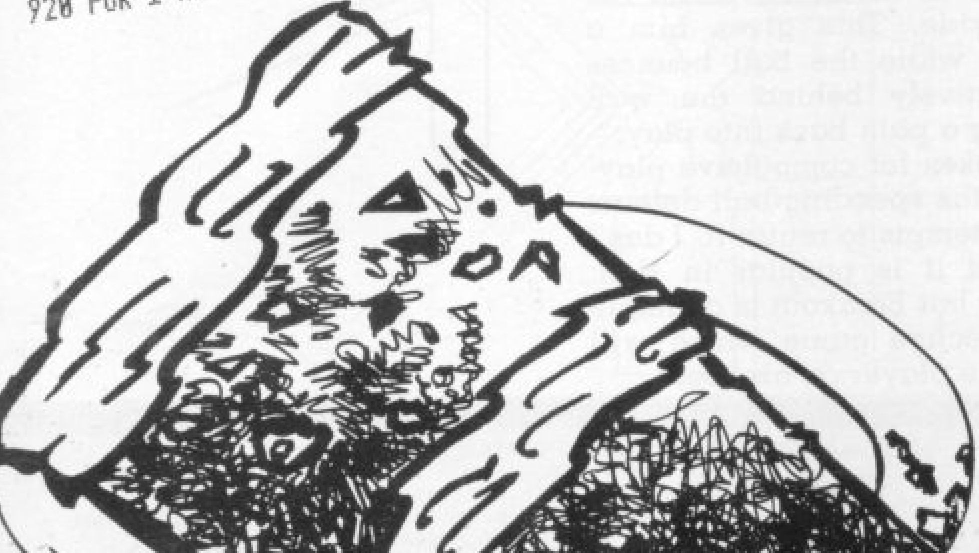
A GAME FOR APPRENTICE POISONERS

continued on page 35

CHOOSE YOUR SLICE WITH CARE

Continued from page 33

```
800 P1=P
810 PRINT"Player ";P1
820 INPUT"Coordinates of CHOMP (Row,Column) ";R1,C1
830 IF R1<1 THEN 900
840 IF R1>R THEN 900
850 IF C1<1 THEN 900
860 IF C1>C THEN 900
870 IF A(R1,C1)=0 THEN 900
880 IF A(R1,C1)=-1 THEN 980
885 PRINT" "
890 GOTO 920                       "
900 PRINT"                               "
901 PRINT"You can't CHOMP an empty space!!
910 FOR D=1 TO 5000:NEXT D:GOTO 810
920 FOR I=R1 TO R
930 FOR J=C1 TO C
940 A(I,J)=0
950 NEXT J
960 NEXT I
970 GOTO 610
980 PRINT" "
990 PRINT"Bad luck you have lost player ";P1
1000 PRINT
1010 PRINT"Do you want to play again (YES OR NO) "
1020 INPUT A$
1030 IF A$="YES" THEN 290
1035 PRINT" "                                   ";
1036 PRINT"
1037 PRINT"CLOSEDOWN!!"
1040 L1$="C4C1R1C5D5_B6C3D5"
1050 L2$="E4E1R1E5F5E6D3C5"
1060 L3$="D5C5_B5C7C3R2"
1070 L4$="C3D3E3F3G4G1R1G4G1R1G4G1R1"
1080 L5$="G6F3E5F4F1R1F4F1R1F4F1R1"
1090 L6$="F6E3D5E5F3E3D3C3"
2000 L7$="E6F3G5A3F3E7D7C8"
2010 TEMPO5
2020 MUSIC L1$;L2$;L3$;L4$;L5$;L6$;L7$
2025 PRINT" "
2030 FOR A=1 TO 300:R=INT(80*RND(1))
2040 S=INT(70*RND(1))
2050 SET R,S:NEXT A
2060 PRINT" "                                   ";
2070 PRINT"
2080 PRINT"G O O D N I G H T ! !"
2090 FOR D=1 TO 300:NEXT D
2100 PRINT" "
2110 FOR BS=1 TO 10000:NEXT BS
2120 END
```





BREAKOUT RUNS ON AN ACORN ATOM IN 3·5K BY TIM JACKSON

BREAKOUT

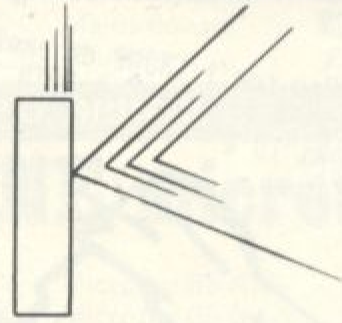
As a study in concentration and instinctive reations, it's hard to beat Breakout.

This is the second generation of "bat and ball" arcade games and the only one to still keep its place in the pub circuit.

The aim of the game is to demolish a brick wall by bounding a moving ball against it by use of a bat.

As the ball hits each brick it vanishes from the screen and the ball rebounds to be hit again. But should it slip past your bat then you lose a life.

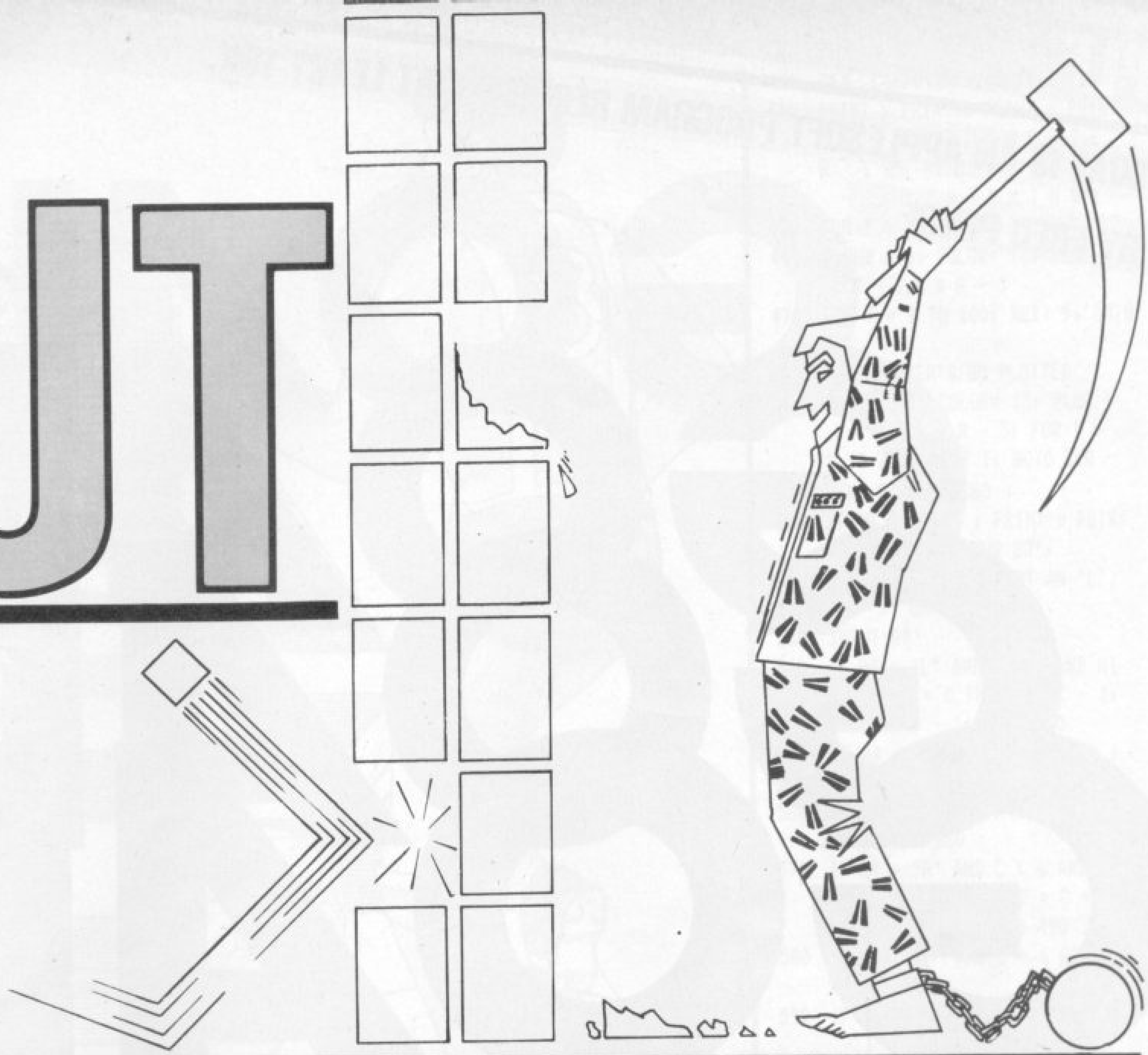
The experienced Breakout player aims his ball continuously at a single spot in the wall to weaken it and let the ball through to wreak havoc on the other side. This gives him a respite while the ball bounces destructively behind the wall seeking a path back into play.



It makes for compulsive playing as the speeding ball defeats your attempts to return it. I don't know if it is popular in H.M. Prisons but Breakout is a simple but effective game which will keep the player on his toes.

```
  1 REM BREAKOUT
  5 REM BY TIM JACKSON,JAN 81
 10 DIM A1,PP5,BB5,LL5,NN6
 20 FOR J=0 TO 5; LLJ=-1; BBJ=-1; PPJ=-1; NEXT
 30 PRINT $12,$21
 40 GOSUB a; GOSUB a
 50 PRINT$6
 60 @=3; C=0
 70gPRINT"              BREAKOUT"'
 80 PRINT"              ========"
 90 PRINT'''"BEST SCORE SO FAR = ",C
100 PRINT'''"HOW FAST DO YOU WANT TO PLAY?"'
110cINPUT"TYPE 1 TO 5 AND PRESS RETURN"',$A
120 IF LEN A >1 GOTO c
130 B=53-?A
140 IF B<0 OR B>4 GOTO c
150 CLEAR 0
160 MOVE 1,0; DRAW 1,44
170 MOVE 62,0; DRAW 62,44
180 ?#E1=0
190 PRINT $#1E,$#A,$9,$223,$223
200 GOSUB e
210 PRINT $#D,$#A,$9; GOSUB e;  PRINT $255,$255,$#D,$#A,$9
220 PRINT $223,$223; GOSUB e;  PRINT $#1E
230 S=0; ?#80=14
240 FOR N=5 TO 1 STEP -1; REM MAIN LOOP
250 X=ABSRND%60+2; Y=35; REM INITIAL X & Y OF BALL
260fU=-1; REM DOWN
270 R=ABSRND%3-1; REM R,L OR 0
280 PRINT" SCORE: ",S,"      BALLS LEFT:",N,$#1E
290 Q=#8000
300 PLOT 13,X,Y
310 Z=3
320 DO REM GRAPHICS LOOP
330 IF B=0 GOTO d
340 FOR J=1 TO B; WAIT; NEXT
350dWAIT
360 LINK LL0
370 UNTIL Z<3
380 IF Z=0 PRINT $7; GOTO b
390 REM Z=0 IF BAT MISSED
400 IF Z=2 S=S+50; LINK NN0; GOTO b
410 REM Z=2 IF THRO' GAP
420 REM Z=1 IF BRICK HIT, AND
430 REM Q THEN HOLDS SCREEN
440 REM ADDRESS OF BRICK HIT
450 IF Q%2=1 Q=Q+1
460 M=Q-1
470 ?M=#59; ?Q=#66
480 LINK NN3
490 ?M=#40; ?Q=#40
500 S=S+10; GOTO f
510bNEXT N; REM NEXT BALL
520 PRINT"FINAL SCORE: ",S,"  BALLS LEFT: 0",$#1E
530 FOR J=1 TO 15; P.$#A; NEXT
540 PRINT $9,"PRESS SPACE BAR TO PLAY AGAIN "
550 LINK #FFE3
560 IF S>C C=S
570 PRINT $12; GOTO g
580aDIM P(-1)
590[:LL0
600 LDA #B001
610 AND @#80
620 BEQ LL2
630 LDA #B002
640 AND @#40
650 BNE LL3
660:LL1 LDA #80
670 CMP @28
680 BCS LL3
690 INC #80
700 BNE LL3
710:LL2 LDA #80
720 CMP @2
730 BCC LL3
740 DEC #80
750:LL3 LDX @30
760:LL4 LDA #81E0,X
770 AND @#FC
780 STA #81E0,X
790 DEX
800 BNE LL4
810 LDX #80
820 LDY @3
830:LL5 LDA #81E0,X
840 ORA @3
850 STA #81E0,X
860 INX
870 DEY
880 BNE LL5
890 LDA @2
900 STA #5E
910 LDA #33A
920 BEQ BB1 OUT IF Y=0
930 STA #5C
940 LDA #339
950 STA #5A
960 JSR #F6E2 BLANK BALL
970 LDA #339
980 CMP @2 CHECK L.H. WALL
```

OUT



```
 990 BNE BB2
1000 LDA @1; STA #333
1010 BNE BB3
1020:BB2 CMP @61 CHECK R.H.WALL
1030 BNE BB4
1040 LDA @#FF; STA #333
1050:BB3 LDA #339
1060:BB4 CLC
1070 ADC #333
1080 STA #339 NEW X
1090 JSR PP0
1100 CLC
1110 LDA #33A
1120 ADC #336
1130 CMP @45
1140 BEQ BB0 OUT IF THRO' GAP
1150 STA #33A NEW Y
1160 LDA #339; STA #5A
1170 LDA #33A; STA #5C
1180 JSR #F6E2 PLOT BALL
1190 RTS
1200:BB0 LDA @2; STA #33B
1210 RTS  OUT WITH Z=2
1220:BB1 STA #33B;RTS OUT WITHZ=0
1230:PP0 LDA #339
1240 LSR A
1250 STA #5F STORE X/2
1260 LDA @47
1270 SEC
1280 SBC #33A
1290 SBC #336   Y = NEW Y
1300 LDX @#FF
1310 SEC
1320:PP1 INX
1330 SBC @3
1340 BCS PP1
1350 ADC @3
1360 STA #61 STORE (47-Y)%3
1370 TXA; ASL A; ASL A
1380 ASL A; ASL A; ASL A
1390 ORA #5F
1400 STA #5F STORE (X/2)|(47-Y)/3*32
1410 LDA @#80; ADC @0
1420 STA #60 HI BYTE OF SCREEN ADDRESS
1430 LDA #339; LSR A
1440 LDA #61
1450 ROL A; TAY
1460 LDA #F7CB,Y
1470 LDY @0
1480 AND (#5F),Y
1490 BEQ PP5 RTN IF BIT CLEAR
1500 LDA #33A
1510 CMP @1; BNE PP3
1520 LDA @1
1530 STA #336 GO UP IF BAT HIT
1540 LDA #B001; AND @#80
1550 BNE PP4 BRANCH IF NO SHIFT
1560 LDA #333; BMI PP5
1570 DEC #333; DEC #339 DEC X&R
1580 RTS
1590:PP4 LDA #B002
1600 AND @#40
1610 BNE PP5 RTN IF NO REPT
1620 LDA #333; CMP @1
1630 BEQ PP5
1640 INC #333; INC#339  INC R&X
1650:PP5 RTS
1660:PP3 LDA @1
1670 STA #33B  Z=1
1680 LDA #5F
1690 STA #332   SAVE BRICK POSN IN Q
1700 RTS
1710:NN0 LDA #B002 HIGH BLEEP
1720 LDY @#FF
1730:NN1 LDX @#80
1740:NN2 DEX
1750 BNE NN2
1760 EOR @4
1770 STA #B002
1780 DEY
1790 BNE NN1
1800 RTS
1810:NN3 LDA @3 EXPLOSION
1820 STA #81
1830:NN4 LDX @#FF
1840:NN5 TXA; TAY
1850 LDA #B002
1860 EOR @4
1870 STA #B002
1880:NN6 DEY; BNE NN6
1890 DEX; BNE NN5
1900 DEC #81; BNE NN4
1910 RTS
1920] RETURN
1930eFOR I=1 TO 7
1940 PRINT $255,$255,$223,$223;NEXT
1950 RETURN
```

GOAL IS AN APPLESOFT PROGRAM REQUIRING AT LEAST 16K.

BY FRED PENCE

GOAL

At the far end of the board, the Goal is beckoning as you and the computer plan your respective routes to victory.

The computer is out to make things difficult for you but achieving life's goals should never be easy.

Moving a single counter alternately you must aim to outwit your opponent and be first to move into that elusive Goal area and win the game.

You can choose who takes the first move in this game of strategy and thinking ahead. If you wish the computer to go first, enter nought, or key-in a number between one and six if you are taking the first move.

Once the counter is set in motion, it can only be moved left, right or down but it cannot be returned to a box it has already entered.

Good use is made of the Apple graphics in a well thought out game with plenty of scope for tactical maneouvring.

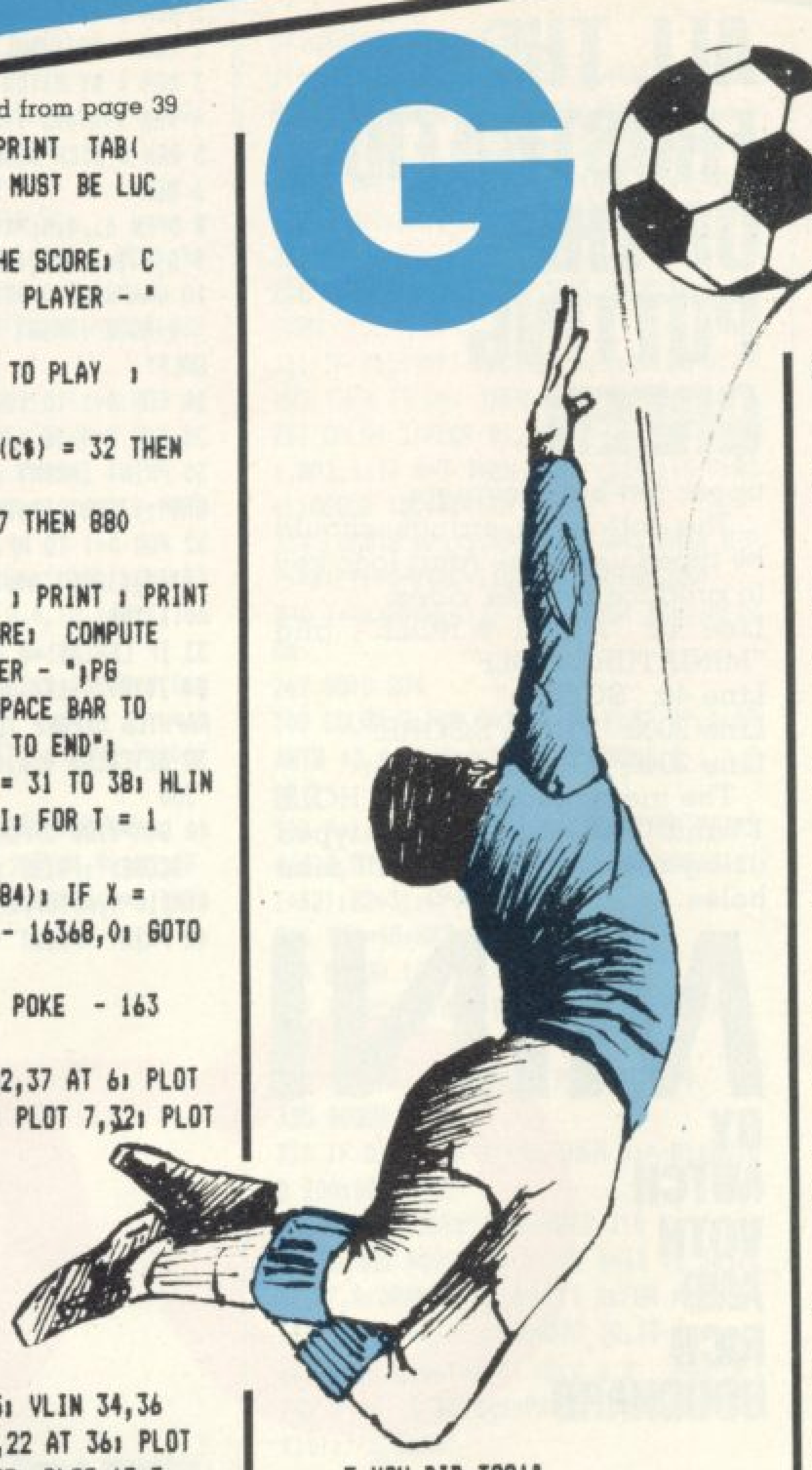
```
0  REM ******************
1  REM **              **
2  REM **     GOAL     **
3  REM **      BY      **
4  REM **  FRED PENCE  **
5  REM **              **
6  REM **  NOV, 1979   **
7  REM **              **
8  REM ******************
10  GOTO 1000
20  HOME : GR
30  DIM A(6,7)
40  FOR M1 = 0 TO 6: FOR M2 = 0 TO
     7:A(M1,M2) = 0: NEXT M2: NEXT
     M1
50 R = 1:C = 1
60  HOME : GR : COLOR= 1: FOR X =
     2 TO 38 STEP 6: VLIN 0,30 AT
     X: NEXT X: VLIN 31,39 AT 2: VLIN
     31,39 AT 38
70  FOR Y = 0 TO 30 STEP 6: HLIN
     2,38 AT Y: NEXT Y: HLIN 2,38
     AT 39
80  REM  PRINTING 'GOAL'
90  COLOR= 12
100  HLIN 5,10 AT 33: HLIN 5,10 AT
     37: HLIN 8,10 AT 35: VLIN 33
     ,37 AT 5: VLIN 35,37 AT 10
110  HLIN 14,19 AT 33: HLIN 14,19
     AT 37: VLIN 33,37 AT 13: VLIN
     33,37 AT 19
120  HLIN 22,27 AT 33: HLIN 22,27
     AT 35: VLIN 33,37 AT 22: VLIN
     33,37 AT 27
130  HLIN 30,35 AT 37: VLIN 33,37
     AT 30
140  IF PG > = 2 THEN  PRINT "O.
     K. YOUR GO ";: GOTO 160
150  GOTO 200
160  PRINT "- A NUMBER FROM 1 TO
     6";: INPUT N
170  IF N < 1 OR N > 6 THEN  PRINT
     : PRINT "NO - YOUR GO ";: GOTO
     160
180  IF N =  INT (N) THEN 280
190  PRINT : PRINT "AN INTEGER ";
     : GOTO 160
200  PRINT "ENTER AN INTEGER FROM
     1 TO 6 IF YOU WANT TO GO FI
     RST."
210  PRINT "  IF YOU WANT ME TO G
     O FIRST ENTER 0";: INPUT N
```



```
220  IF  INT (N) = N THEN 260
230  PRINT : PRINT
240  PRINT "   E N T E R   A N
     I N T E G E R"
250  PRINT : PRINT "       (BETWE
     EN 0 AND 6)  ";: INPUT N
260  IF N > 6 OR N < 0 THEN  PRINT
     : PRINT : PRINT : PRINT : GOTO
     240
270  IF N = 0 THEN C =  INT (6 *
     RND (2) + 1):A(R,C) =  - 1:
     GOTO 440
280 C = N:A(R,C) =  - 1:
290  GOTO 490
300  REM  COMPUTER'S GO
310  IF R = 5 THEN CG = CG + 1: GOTO
     760
320  IF (C -  INT (C / 2) * 2) =
     0 THEN 390
330  REM  MOVE RIGHT
340  IF A(R,C + 1) = 0 THEN C = C
     + 1:A(R,C) =  - 1: GOTO 440
350  IF R < 4 THEN J =  INT (3 *
     ( RND (2))): IF J > 1 THEN R
     = R + 1:A(R,C) =  - 1: GOTO
     440
360  IF A(R,C - 1) = 0 AND C > 1 THEN
     C = C - 1:A(R,C) =  - 1: GOTO
     440
370 R = R + 1:A(R,C) =  - 1: GOTO
     440
380  REM  MOVE LEFT
390  IF A(R,C - 1) = 0 THEN C = C
     - 1:A(R,C) =  - 1: GOTO 440
400  IF R < 4 THEN J =  INT (3 *
     RND (2)): IF J > 1 THEN R =
     R + 1:A(R,C) =  - 1: GOTO 44
     0
410  IF A(R,C + 1) = 0 AND C < 6 THEN
     C = C + 1:A(R,C) =  - 1: GOTO
     440
420 R = R + 1:A(R,C) =  - 1
430  REM  COMPUTER'S GO PLOTTED
440  PRINT : PRINT : PRINT : PRINT
     "    T H E    C O M P U T E
     R  I S": PRINT : PRINT "
           T H I N K I N G";
450  FOR T = 1 TO 1000: NEXT T
460  GOSUB 870: COLOR= 13: PLOT 6
     * C - 1,6 * R - 3
470  FOR T = 1 TO 100: NEXT T: GOTO
     510
480  REM  PLAYER'S GO PLOTTED
490  GOSUB 870: COLOR= 13: PLOT 6
     * C - 1,6 * R - 3: FOR T =
     1 TO 200: NEXT T: GOTO 310
500  REM  PLAYER'S GO
510  PRINT : PRINT : PRINT : PRINT
     "         IT'S YOUR GO";
520  PRINT : PRINT "INPUT AN 'L',
     AN 'R' OR A 'D'  ";
530  INPUT G$
540  IF G$ = "L" AND C > 1 AND A(
     R,C - 1) = 0 THEN C = C - 1:
     A(R,C) =  - 1: GOTO 490
550  IF G$ = "L" AND C = 1 THEN 6
     40
560  IF G$ = "L" AND A(R,C - 1) =
      - 1 THEN 660
570  IF G$ = "R" AND C < 6 AND A(
     R,C + 1) = 0 THEN C = C + 1:
     A(R,C) =  - 1: GOTO 490
580  IF G$ = "R" AND C = 6 GOTO 6
     40
590  IF G$ = "R" AND A(R,C + 1) =
      - 1 THEN 660
600  IF G$ = "D" AND R < 5 THEN R
      = R + 1:A(R,C) =  - 1: GOTO
     490
610  IF G$ = "D" AND R = 5 THEN P
     G = PG + 1: GOTO 690
620  IF G$ = "U" THEN  PRINT : PRINT
     : PRINT "   YOU CAN'T GO BAC
     K UP": GOTO 520
630  PRINT : PRINT : PRINT : PRINT
     : PRINT " YOU MUST EITHER US
     E 'L' OR 'R' OR 'D'": GOTO
     530
640  PRINT : PRINT : PRINT : PRINT
     "  YOU CAN'T MAKE THAT MOVE.
        IT'S OFF": PRINT "THE BOA
     RD."
650  GOTO 520
660  PRINT : PRINT : PRINT : PRINT
     " YOU CAN'T MOVE THERE; THAT
     'S WHERE ": PRINT "THE COUNT
     ER WAS JUST MOVED FROM."
670  GOTO 520
680  REM  PLAYER WINS
690  COLOR= 0: FOR Z = 1 TO 6: PLOT
     6 * Z - 1,27: NEXT Z
```

continued on page 41

GOAL



Continued from page 39

```
700  PRINT : PRINT : PRINT  TAB(
      7)"YOU WIN.  YOU MUST BE LUC
      KY!"
710  PRINT : PRINT "THE SCORE: C
      OMPUTER - ";CG;"  PLAYER - "
      ;PG
720  PRINT "SPACE BAR TO PLAY  :
      'ESC' TO END";
730  GET C$: IF  ASC (C$) = 32 THEN
      40
740  IF  ASC (C$) = 27 THEN 880
750  GOTO 720
760  GOSUB 870: PRINT : PRINT : PRINT
      : PRINT "THE SCORE:  COMPUTE
      R - ";CG;"  PLAYER - ";PG
770  PRINT : PRINT "SPACE BAR TO
      PLAY : 'ESC' KEY TO END";
780  COLOR= 0: FOR I = 31 TO 38: HLIN
      3,37 AT I: NEXT I: FOR T = 1
      TO 200: NEXT T
790  X =  PEEK ( - 16384): IF X =
      160 THEN  POKE  - 16368,0: GOTO
      40
800  IF X = 155 THEN  POKE  - 163
      68,0: GOTO 880
810  COLOR= 6: VLIN 32,37 AT 6: PLOT
      5,32: PLOT 5,37: PLOT 7,32: PLOT
      7,37
820  VLIN 32,34 AT 15: VLIN 34,36
      AT 16: HLIN 16,22 AT 36: PLOT
      17,37: PLOT 20,37: PLOT 15,3
      4: PLOT 15,35: VLIN 33,36 AT
      22: VLIN 32,34 AT 23: PLOT 1
      9,34: PLOT 19,35: PLOT 18,37
      : PLOT 21,37
830  VLIN 32,37 AT 26: PLOT 25,32
      : PLOT 25,37: PLOT 27,32: PLOT
      27,37
840  VLIN 32,37 AT 29: VLIN 32,37
      AT 33: PLOT 30,33: PLOT 30,
      34: PLOT 31,34: PLOT 31,35: PLOT
      32,35: PLOT 32,36
850  PRINT "";
860  FOR T = 1 TO 100: NEXT T: GOTO
      780
870  COLOR= 0: NORMAL : FOR F = 1
      TO 6: FOR G = 1 TO 5: PLOT
      6 * F - 1,6 * G - 3: NEXT G:
      NEXT F: RETURN
880  TEXT : HOME : VTAB 14: PRINT
      TAB( 10);"WELL I ENJOYED IT
      ";
890  PRINT : PRINT  TAB( 10);"HOP
      E YOU DID TOO!"
900  PRINT : PRINT : PRINT : END
1000  HOME : GR : COLOR= 13
1010  HLIN 9,15 AT 8: VLIN 8,12 AT
       12
1020  VLIN 8,12 AT 18: VLIN 8,12 AT
       23: HLIN 18,22 AT 10
1030  HLIN 26,30 AT 8: HLIN 26,29
       AT 10: HLIN 26,30 AT 12: VLIN
       8,12 AT 26
1040  HLIN 5,10 AT 17: HLIN 5,10 AT
       21: HLIN 8,10 AT 19: VLIN 17
       ,21 AT 5: VLIN 19,21 AT 10
1050  HLIN 5,10 AT 17: HLIN 5,10 AT
       21: HLIN 8,10 AT 19: VLIN 17
       ,21 AT 5: VLIN 19,21 AT 10
1060  VLIN 17,21 AT 13: VLIN 17,2
       1 AT 19: HLIN 13,19 AT 17: HLIN
       13,19 AT 19
1070  VLIN 17,21 AT 22: VLIN 17,2
       1 AT 27: HLIN 22,27 AT 18: PLOT
       23,17: PLOT 26,17: PLOT 24,1
       9: PLOT 25,19
1080  HLIN 30,34 AT 17: HLIN 30,3
       3 AT 19: HLIN 30,34 AT 21: VLIN
       17,21 AT 30
1090  HLIN 14,19 AT 25: HLIN 14,1
       9 AT 29: VLIN 25,29 AT 13: VLIN
       25,29 AT 19
1100  HLIN 22,27 AT 25: HLIN 22,2
       5 AT 27: VLIN 25,29 AT 22
1110  HLIN 5,10 AT 33: HLIN 5,10 AT
       37: HLIN 8,10 AT 35: VLIN 33
       ,37 AT 5: VLIN 35,37 AT 10
1120  HLIN 14,19 AT 33: HLIN 14,1
       9 AT 37: VLIN 33,37 AT 13: VLIN
       33,37 AT 19
1130  HLIN 22,27 AT 33: HLIN 22,2
       7 AT 35: VLIN 33,37 AT 22: VLIN
       33,37 AT 27
1140  HLIN 30,35 AT 37: VLIN 33,3
       7 AT 30
1150  VTAB 24: PRINT  TAB( 20);"A
       PENCE PROGRAM";
1160  FOR K = 1 TO 5000: NEXT K
1170  TEXT : HOME : VTAB 3: PRINT
       " YOU AND THE COMPUTER WILL
       ALTERNATELY"
1180  PRINT : PRINT "  MOVE A COU
       NTER UNTIL THE WINNER MOVES"
1190  PRINT : PRINT "  INTO THE G
       OAL AREA.": PRINT
1200  PRINT
1210  PRINT : PRINT "   YOU MAY
       CHOOSE WHO YOU WANT TO MOVE
       FIRST:"
1220  PRINT
1230  PRINT "   0 FOR COMPUTER TO
       MOVE FIRST"
1240  PRINT
1250  PRINT "   A NUMBER FROM 1 T
       O 6 TO PICK A BOX"
1260  PRINT "   IN THE UPPER ROW
       FOR YOUR GO"
1270  PRINT : PRINT "THEREAFTER Y
       OU MOVE LEFT, RIGHT OR DOWN"
1280  PRINT "BUT YOU CANNOT RETUR
       N TO A PREVIOUS BOX."
1290  PRINT : PRINT "  (ADAPTED
       FROM A GAME IN 'MATHEMATICS
       IN MICHIGAN')  'SPACE BAR'
       TO CONTINUE";
1300  GET S$: IF  ASC (S$) = 32 THEN
       20
1310  GOTO 1300
1320  END
```

ALL THE FRUSTRATION OF THE PUTTING GREEN

MINI GOLF

BY MITCH VOTH AND RICH BOUCHARD

No municipal park, or seafront worthy of the rock bearing its name, should be without a putting green.

Those nine to 18 patches of well manicured turf which can divide friends and turn happy families into bitter rivals.

Remember that straggling white bush on the eighth, which belied its battered appearance and refused to surrender its white prize until the fifth stroke.

Or how about the fifth hole, whose cup protruded a solid half inch above the surrounding circle of dried and dented earth.

If someone were to write a thesis proving that that famous stiff upper lip was tempered on the putting greens of England . . . I wouldn't be at all surprised!

If you thought you had left those ninth green dandelion beheading tantrums behind you, this program will bring them back all over again. In fact the only putting frustration not to be experienced on this computerised version, is the wait for the previous group to move on.

Mini Golf is an excellent representation of a nine-hole miniature putting green, which will accommodate up to 10 players.

You control the angle of your putter by pressing the keys marked "+" and "*", which have small arrows marked on their upper left-hand corners.

The following strings should be typed using the Atari logo key to produce reverse video:
Line 10: "ATARI 9 HOLE", and "MINIATURE GOLF"
Line 40: "SCORE:"
Line 2000: "FINAL SCORE:"
Line 2040: "GOOD BYE."

The messages such as: "HOLE 1" and "PAR 2" should be typed using reverse video for all nine holes.




```
1 REM * MINIATURE GOLF
2 REM * ORIGINAL PROGRAM BY
3 REM * BY MITCH VOTH
4 REM * ATARI TRANSLATION BY
5 REM * RICH BOUCHARD
6 REM
8 OPEN #1,4,0,"K:"
9 DIM Z$(100),A$(30),S(10)
10 GRAPHICS 0:PRINT "                ATARI
  9-HOLE":PRINT "             MINIATURE
GOLF"
20 FOR A=1 TO 100:Z$(A)=" ":NEXT A
25 FOR A=1 TO 10:S(A)=0:NEXT A
30 PRINT :PRINT :PRINT "NUMBER OF PLAY
ERS";:INPUT NP:IF NP>10 THEN 10
32 FOR A=1 TO NP:S(NP)=0:PRINT "PLAYER
 #";A;:INPUT A$:IF LEN(A$)>10 THEN A$=
A$(1,10)
33 IF LEN(A$)=0 THEN A$=" "
34 Z$(A*10-LEN(A$)+1,A*10)=A$:NEXT A:G
RAPHICS 5:POKE 752,1
38 SETCOLOR 0,0,0:SETCOLOR 4,3,10:GOTO
 300
40 GRAPHICS 0:POKE 752,1:PRINT "
  SCORE:":PRINT :FOR A=1 TO NP:PRINT Z
$(A*10-9,A*10),S(A):NEXT A
42 PRINT :PRINT "HIT ANY KEY":GET #1,A
:GRAPHICS 5:POKE 752,1:SETCOLOR 0,0,0:
SETCOLOR 4,3,10:RETURN
50 GET #1,Z:IF Z<58 AND Z>48 THEN HH=(
Z-48)*11:HM=0:VM=0:COLOR A:PLOT C1,C2:
GOTO 200
60 T=0:IF Z<>43 THEN 70
62 CP=CP+1:IF CP=17 THEN CP=1
64 COLOR A:PLOT C1,C2:GOTO 100
70 IF Z<>42 THEN 50
72 CP=CP-1:IF CP=0 THEN CP=16
74 COLOR A:PLOT C1,C2:GOTO 100
90 COLOR 1:PLOT HP1,HP2:PLOT HP1+1,HP2
92 COLOR 3:PLOT B1,B2:LOCATE C1,C2,A:I
F A<>2 THEN COLOR 2:PLOT C1,C2:GOTO 50
94 COLOR 3:PLOT C1,C2:GOTO 50
100 GOTO CP+100
101 C1=B1:C2=B2+2:M1=0:M2=-1:GOTO 90
102 C1=B1+1:M1=-1:GOTO 90
103 C1=B1+2:C2=B2+2:M1=-2:GOTO 90
104 C2=B2+1:M2=-0.5:GOTO 90
105 C2=B2:M2=0:GOTO 90
106 C2=B2-1:M2=0.5:GOTO 90
107 C1=B1+2:C2=B2-2:M1=-2:M2=1:GOTO 90
108 C1=B1+1:M1=-1:GOTO 90
```

OLF



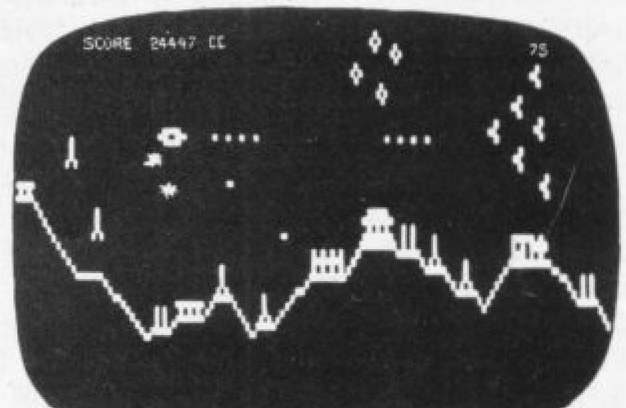
```
109 C1=B1:M1=0:GOTO 90
110 C1=B1-1:M1=1:GOTO 90
111 C1=B1-2:C2=B2-2:M1=2:M2=1:GOTO 90
112 C2=B2-1:M2=0.5:GOTO 90
113 C2=B2:M2=0:GOTO 90
114 C2=B2+1:M2=-0.5:GOTO 90
115 C1=B1-2:C2=B2+2:M1=2:M2=-1:GOTO 90
116 C1=B1-1:M1=1:GOTO 90
150 COLOR 3:PLOT HP1,HP2:PLOT HP1+1,HP
2:IF S>1 THEN 156
152 PRINT "A HOLE IN ONE!!!!!!";FOR A=
1 TO 5:FOR B=1 TO 59:SETCOLOR 4,B/4+1,
14:SOUND 0,B,0,10:NEXT B:NEXT A
154 SETCOLOR 4,3,10:SOUND 0,0,0,0:GOTO
 158
156 PRINT "THAT TOOK YOU ";S;" STROKES
";FOR A=1 TO 50:SOUND 0,A,10,10:NEXT A
:FOR A=49 TO 2 STEP -1
157 SOUND 0,A,10,10:NEXT A:SOUND 0,0,0
,0
158 FOR A=1 TO 700:NEXT A:PRINT CHR$(2
8);"
";PRINT CHR$(28);CHR$(28);:RETURN
200 D1=B1:D2=B2:COLOR 2:PLOT B1,B2:IF
(ABS(M1)=1 AND HM=1) OR ABS(M1)=2 THEN
 204
202 HM=1:GOTO 210
204 D1=B1+SGN(M1):HM=0
205 T=T+1:IF T>4 THEN RC=2:RETURN
210 SOUND 0,200,10,10:SOUND 0,0,0,0:LO
CATE D1,B2,A:IF A=0 THEN RC=0:RETURN
211 IF (D1<>HP1 AND D1<>HP1+1) OR D2<>
HP2 THEN IF A=1 THEN RC=0:RETURN
212 COLOR 3:PLOT D1,B2:B1=D1:LOCATE HP
1,HP2,A:IF A<>1 THEN S(PT)=S(PT)+S-P:R
C=1:GOSUB 150:RETURN
214 LOCATE HP1+1,HP2,A:IF A<>1 THEN S(
PT)=S(PT)+S-P:RC=1:GOSUB 150:RETURN
220 COLOR 2:PLOT B1,B2:IF (ABS(M2)=0.5
 AND VM=1) OR ABS(M2)=1 THEN D2=B2+SGN
(M2):VM=0:GOTO 230
222 VM=1
230 LOCATE B1,D2,A:IF A=0 THEN RC=0:RE
TURN
231 IF (D1<>HP1 AND D1<>HP1+1) OR D2<>
HP2 THEN IF A=1 THEN RC=0:RETURN
232 COLOR 3:PLOT B1,D2:B2=D2:LOCATE HP
1,HP2,A:IF A=3 THEN S(PT)=S(PT)+S-P:RC
=1:GOSUB 150:RETURN
234 LOCATE HP1+1,HP2,A:IF A=3 THEN S(P
T)=S(PT)+S-P:RC=1:GOSUB 150:RETURN
240 T=0:HH=HH-1:IF HH<0 THEN RC=2:RETU
RN
242 GOTO 200
300 COLOR 2:FOR A=3 TO 36:PLOT 27,A:DR
AWTO 45,A:NEXT A:PRINT "  HOLE # 1   P
AR 2"
302 P=2:FOR PT=1 TO NP:S=1:PRINT Z$(PT
*10-9,PT*10);"'S TURN":B1=INT(RND(0)*1
1+32):B2=31:CP=1
304 HP1=35:HP2=6
305 GOSUB 100
310 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 310
320 IF RC=1 THEN NEXT PT:GOTO 400
325 GOSUB 3000
330 IF D1=26 OR D1=46 THEN M1=-M1:GOSU
B 200:GOTO 310
332 M2=-M2:GOSUB 200:GOTO 310
400 GOSUB 40:COLOR 2:FOR A=13 TO 36:PL
OT 27,A:DRAWTO 45,A:NEXT A:FOR A=0 TO
11:PLOT 27+A,13-A:DRAWTO 70,13-A
402 NEXT A:PRINT "  HOLE # 2   PAR 2";
FOR PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT
*10);"'S TURN"
404 HP1=60:HP2=8:B1=INT(RND(0)*11+32):
B2=31
405 CP=1:GOSUB 100
420 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 420
430 IF RC=1 THEN NEXT PT:GOTO 500
435 GOSUB 3000
440 IF D2=1 OR D2=37 OR (D2=14 AND D1>
45) THEN M2=-M2:GOSUB 200:GOTO 420
442 IF D1<27 OR D1=46 OR D1=71 THEN M1
=-M1:GOSUB 200:GOTO 420
444 A=M1:M1=-M2*2:M2=-A/2:GOSUB 200:GO
TO 420
500 GOSUB 40:COLOR 2:FOR A=13 TO 36:PL
OT 17,A:DRAWTO 55,A:NEXT A:FOR A=0 TO
11:PLOT 17+A,13-A:DRAWTO 55-A,13-A
502 NEXT A:COLOR 1:PLOT 36,10:DRAWTO 3
6,36
510 PRINT "  HOLE # 3   PAR 2":FOR PT=
1 TO NP:PRINT Z$(PT*10-9,PT*10);"'S TU
RN":B1=INT(RND(0)*11+42)
512 S=1:B2=32:CP=1:HP1=25:HP2=32:GOSUB
 100
520 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 520
530 IF RC=1 THEN NEXT PT:GOTO 600
540 GOSUB 3000
550 IF D2=1 OR D2=37 THEN M2=-M2:GOSUB
 200:GOTO 520
552 IF D1=16 OR D1=36 OR D1=56 THEN M1
=-M1:GOSUB 200:GOTO 520
554 IF D1<36 THEN A=M1:M1=-M2*2:M2=-A/
2:GOSUB 200:GOTO 520
556 A=M1:M1=M2*2:M2=A/2:GOSUB 200:GOTO
 520
600 GOSUB 40:COLOR 2:FOR A=13 TO 24:PL
OT 21,A:DRAWTO 63,A:NEXT A:FOR A=25 TO
 36:PLOT 21,A:DRAWTO 35,A:NEXT A
602 FOR A=1 TO 8:PLOT 36+A,24+A:DRAWTO
 63-A,24+A:PLOT 21+A,13-A:DRAWTO 63-A,
13-A:NEXT A
604 COLOR 1:PLOT 36,25:DRAWTO 36,14:DR
AWTO 51,14:PLOT 51,14:DRAWTO 51,24
610 P=3:PRINT "  HOLE # 4   PAR 3":FOR
 PT=1 TO NP:PRINT Z$(PT*10-9,PT*10);"'
S TURN":B1=INT(RND(0)*8)+20
615 S=1:B2=32:CP=1:HP1=43:HP2=19:GOSUB
 100
620 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 620
630 IF RC=1 THEN NEXT PT:GOTO 700
640 GOSUB 3000
650 IF D2=4 OR D2=12 OR D2=37 OR (D2=3
3 AND D1>44 AND D1<55) OR (D2=14 AND D
1>36) THEN 654
652 GOTO 656
654 M2=-M2:GOSUB 200:GOTO 620
656 IF D1=20 OR D1=49 OR D1=51 OR D1=6
4 OR D1=36 THEN M1=-M1:GOSUB 200:GOTO
620
658 IF (D1>56 AND D2<13) OR (D2>24 AND
 D1<57) THEN A=M1:M1=M2*2:M2=A/2:GOSUB
 200:GOTO 620
659 A=M1:M1=-M2*2:M2=-A/2
660 GOSUB 200:GOTO 620
700 GOSUB 40:COLOR 2:FOR A=25 TO 36:PL
OT 41,A:DRAWTO 55,A:NEXT A:FOR A=1 TO
9:PLOT 33-A,25-A:DRAWTO 55,25-A
702 PLOT 24+A,11-A:DRAWTO 55-A,11-A:NE
XT A:FOR A=1 TO 5:PLOT 24,16-A:DRAWTO
55,16-A:NEXT A
704 COLOR 1:FOR A=1 TO 2:PLOT 55,25-A:
DRAWTO 45,15-A:NEXT A
710 PRINT "  HOLE # 5   PAR 2":P=2:FOR
 PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT*10
```

continued on page 45

THE LATEST AND, INDEED, THE GREATEST

OF THE KANSAS ARCADE SERIES

ARCADE SCRAMBLE



Don't waste your time playing the simple starts to the Big Five games — get straight into the heavy action with this brand-new multi-action, home grown 'Arcade' game.
Yes, it's the famous one of the Arcades, and the first time it's ever been achieved on a computer.
Not that easy though, for without warning suddenly there's a squadron of enemy fighters heading straight at you hell bent on your destruction. Then comes the ack-ack flung at you from the ground batteries to add to your difficulties, and there's the cluster of blimps to make things even more difficult.
But the real nasties are the rockets, which the enemy blast at you, without warning, from the ground installations.
Even if you manage to out-shoot, out-fight, out-manoeuvre that little lot, you still have the mountains to negotiate which is a problem with the fighters streaming through the only available space.
But with this really unbelievable game, you have no less than six different controls at your fingertips, being able to move your bomber forward, backward, up and down, whilst at the same time both firing your guns at the enemy and bombing the installations.
The installations include rocket launch pads, ack-ack batteries, forts, munition dumps and fuel dumps. You do your damnedest to destroy these as they unfold below, so building up your score.
There is so much happening it really is unbelievable with sound adding to the realism of this ultra-fast moving game.

£9.50

Programs are for the Tandy TRS 80 and Video Genie. All prices are VAT paid and postage free. Same day return first class post service. All software fully guaranteed and in stock as we are the actual publishers, not the retailers. Free catalogue upon request.

Kansas

0246 850357. KANSAS CITY SYSTEMS, UNIT 3, SUTTON SPRING WOOD, CHESTERFIELD S44 5XF.

Circle No. 115

ZX80/81 HARDWARE/SOFTWARE

2K RAM PACK	£15.95
4K RAM PACK	£22.95
16K KIT	£32.95
ZX KEYBOARD	£27.95
16K SOFTWARE CASSETTES	from £3.95

DEFLEX
LIFE & 3D/3D £5.95
on one cassette

RAM 80/81

2K & 4K RAM
Static Ram memory expansion for the 80/81. They both work with onboard Ram i.e. 4K plus onboard = 5K. This is the cheapest small memory expansion available anywhere.

16K RAM
Massive add-on memory for 80/81.

16K KIT-A-KIT VERSION
of a 16K Ram. Full instructions included. All memory expansions plug into the user port at the rear of the computer.

16K SOFTWARE

As seen at the ZX Microfair.
DEFLEX This totally new and very addictive game, which was highly acclaimed at the Microfair, uses fast moving graphics to provide a challenge requiring not only quick reaction, but also clever thinking. One and two player versions on same cassette. £3.95
3D/3D LABYRINTH You have all seen 3D Labyrinth games, but this goes one stage beyond; you must manoeuvre within a cubic maze and contend with corridors which may go left/right/up/down. Full size 3D graphical representation. £3.95
CENTIPEDE This is the first implementation of the popular arcade game on any micro anywhere. Never mind your invaders etc this is positively shining, the speed at which this runs makes ZX invaders look like a game of simple snap. £4.95
Please add £1.00 p/p for all hardware.
Software p/p free.
Specify ZX80/81 on order.
ALL OUR PRODUCTS ARE COVERED BY A MONEY BACK GUARANTEE

KEY

A full size keyboard for the 80/81. The keyboard has all the 80/81 functions on the keys, and will greatly increase your programming speed. It is fitted with push type keys as in larger computers. The keyboard has been specially designed for the Sinclair computer and is supplied ready-built. It also has facilities for 4 extra buttons which could be used for on/off switch, reset, etc.

dK'tronics

23 Sussex Road, Gorleston, Great Yarmouth, Norfolk.
Telephone: Yarmouth (0493) 602453

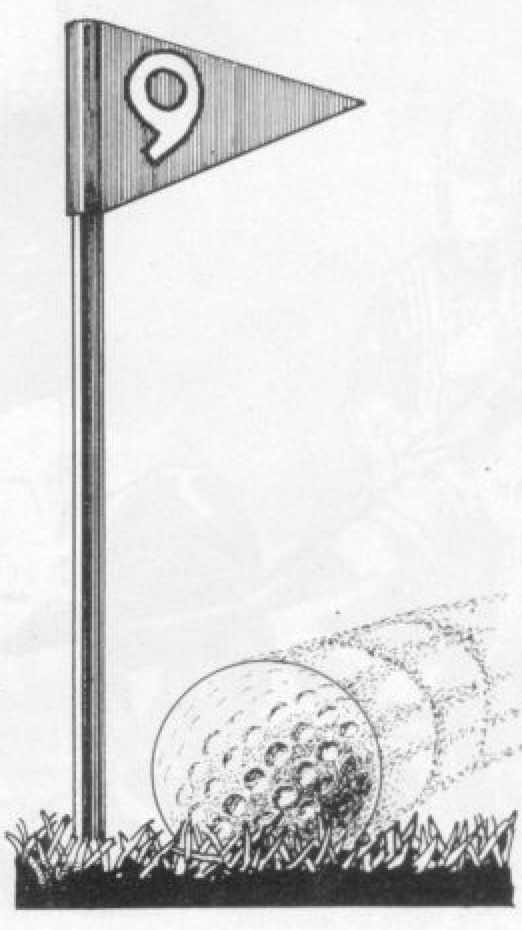
Circle No. 116

continued from page 43

```
);"'S TURN":CP=1
715 B1=INT(RND(0)*8)+43:B2=33:HP1=33:H
P2=13:GOSUB 100
720 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 720
730 IF RC=1 THEN NEXT PT:GOTO 800
740 GOSUB 3000
750 IF D2=1 OR D2=37 OR (D2=25 AND D1<
41) THEN M2=-M2:GOSUB 200:GOTO 720
752 IF D1=23 OR D1=40 OR D1=56 THEN M1
=-M1:GOSUB 200:GOTO 720
754 IF D1<40 AND D2<11 THEN A=M1:M1=-M
2*2:M2=-A/2:GOSUB 200:GOTO 720
756 A=M1:M1=M2*2:M2=A/2:GOSUB 200:GOTO
 720
800 GOSUB 40:COLOR 2:FOR A=25 TO 36:PL
OT 31,A:DRAWTO 45,A:NEXT A:FOR A=1 TO
11:PLOT 31,25-A:DRAWTO 51+A,25-A
801 NEXT A
802 FOR A=2 TO 13:PLOT 31,A:DRAWTO 62,
A:NEXT A:COLOR 1:FOR A=1 TO 2:PLOT 30+
A,24:DRAWTO 39+A,15:NEXT A
804 PLOT 41,15:DRAWTO 41,10:PLOT 49,10
:DRAWTO 49,4
810 PRINT "  HOLE # 6   PAR 3":P=3:FOR
 PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT*10
);"'S TURN"
815 B1=INT(RND(0)*8)+34:B2=33:HP1=35:H
P2=13:CP=1:GOSUB 100
820 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 820
830 IF RC=1 THEN NEXT PT:GOTO 900
840 GOSUB 3000
850 IF D2=5 OR D2=1 OR D2=37 OR (D2=25
 AND D1>45) OR ((D2=10) AND (D1=41 OR
D1=49)) THEN M2=-M2:GOSUB 200:GOTO 820
852 IF D1=30 OR D1=46 OR D1=63 OR D1=4
9 OR (D1=41 AND D2<=16) THEN M1=-M1:GO
SUB 200:GOTO 820
854 A=M1:M1=-M2*2:M2=-A/2:GOSUB 200:GO
TO 820
900 GOSUB 40:COLOR 2:FOR A=1 TO 9:PLOT
 25-A,37-A:DRAWTO 54,37-A:PLOT 15+A,17
-A:DRAWTO 51-A,17-A:NEXT A
902 FOR A=21 TO 27:PLOT 16,A:DRAWTO 54
,A:NEXT A:FOR A=1 TO 4:PLOT 16,16+A:DR
AWTO 50+A,16+A:NEXT A
904 COLOR 1:PLOT 38,11:DRAWTO 50,23:PL
OT 38,16:DRAWTO 45,23:PLOT 26,27:DRAWT
O 38,27
906 PLOT 39,27:DRAWTO 39,36
910 PRINT "  HOLE # 7   PAR 3":P=3:FOR
 PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT*10
);"'S TURN"
915 B1=INT(RND(0)*8)+44:B2=33:HP1=33:H
P2=32:CP=1:GOSUB 100
920 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 920
930 IF RC=1 THEN NEXT PT:GOTO 1000
940 GOSUB 3000
```

MINI GOLF

```
950 IF D1=15 OR D1=55 OR (D1=39 AND D2
>26) THEN M1=-M1:GOSUB 200:GOTO 920
952 IF D2=37 OR D2=7 OR D2=27 THEN M2=
-M2:GOSUB 200:GOTO 920
954 IF D1<25 AND D2<17 THEN A=M1:M1=-M
2*2:M2=-A/2:GOSUB 200:GOTO 920
956 A=M1:M1=M2*2:M2=A/2:GOSUB 200:GOTO
 920
1000 GOSUB 40:COLOR 2:FOR A=27 TO 36:P
LOT 29,A:DRAWTO 43,A:NEXT A:FOR A=1 TO
 8:PLOT 29-A,27-A:DRAWTO 43+A,27-A
1002 PLOT 21,19-A:DRAWTO 52,19-A:PLOT
21+A,11-A:DRAWTO 52-A,11-A:NEXT A
1004 COLOR 1:PLOT 30,11:DRAWTO 33,14:D
RAWTO 33,21:DRAWTO 36,24:PLOT 37,24:DR
AWTO 40,21:DRAWTO 40,14:DRAWTO 43,11
1010 PRINT "  HOLE # 8   PAR 3":P=3:FO
R PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT*1
0)
1015 B1=INT(RND(0)*8+32):B2=33:HP1=36:
HP2=17:CP=1:GOSUB 100
1020 IF RC=2 THEN S=S+1:CP=1:GOSUB 100
:GOTO 1020
1030 IF RC=1 THEN NEXT PJ:GOTO 1100
1040 GOSUB 3000
1050 IF D2=37 OR D2=2 THEN M2=-M2:GOSU
B 200:GOTO 1020
1051 IF D1=33 OR D1=40 THEN IF D2=21 O
R D2=14 THEN 1054
1052 IF D1=20 OR D1=53 OR D1=33 OR D1=
40 OR D1=28 OR D1=44 THEN M1=-M1:GOSUB
 200:GOTO 1020
1054 IF (D1>43 AND D2>18) OR (D1<30 AN
D D2<11) OR (D1>36 AND D1<44) THEN A=M
1:M1=-M2*2:M2=-A/2:GOSUB 200:GOTO 1020
1056 A=M1:M1=M2*2:M2=A/2:GOSUB 200
1060 GOTO 1020
1100 GOSUB 40:COLOR 2:FOR A=27 TO 36:P
LOT 29,A:DRAWTO 43,A:NEXT A:FOR A=3 TO
 27:PLOT 20,A:DRAWTO 52,A:NEXT A
1102 COLOR 1:PLOT 34,10:DRAWTO 31,13:P
LOT 39,10:DRAWTO 42,13:PLOT 27,14:DRAW
TO 35,22:PLOT 38,22:DRAWTO 46,14
1110 PRINT "  HOLE # 9   PAR 4":P=4:FO
R PT=1 TO NP:S=1:PRINT Z$(PT*10-9,PT*1
0);"'S TURN"
1115 B1=INT(RND(0)*8+32):B2=33:HP1=36:
HP2=17:CP=1:GOSUB 100
1120 IF RC=2 THEN S=S+1:CP=1:GOSUB 100
:GOTO 1120
1130 IF RC=1 THEN NEXT PT:GOTO 2000
1140 GOSUB 3000
1150 IF D2=37 OR D2=2 OR D2=28 THEN M2
=-M2:GOSUB 200:GOTO 1120
1152 IF D1=19 OR D1=53 OR ((D1=28 OR D
1=44) AND D2>26) THEN M1=-M1:GOSUB 200
:GOTO 1120
1154 IF (D1>37 AND D2>13) OR (D1<36 AN
D D2<14) THEN A=M1:M1=-M2*2:M2=-A/2:GO
SUB 200:GOTO 1120
1156 A=M1:M1=M2*2:M2=A/2:GOSUB 200
1160 GOTO 1120
2000 GRAPHICS 0:PRINT "    FINAL SCORE
:":PRINT :PRINT "    PLAYER  SCORE":PR
INT "-----------------"
2005 FOR A=1 TO NP:PRINT Z$(A*10-9,A*1
0);" : ";S(A):NEXT A
2010 PRINT :PRINT "PLAY AGAIN (Y/N)";
2020 GOSUB 3000:A=PEEK(764):IF A<>43 A
ND A<>35 THEN 2020
2030 IF A=43 THEN RUN
2040 PRINT :PRINT :PRINT "GOOD BYE.":C
LOSE #1:END
3000 SOUND 0,50,10,10
3005 HH=HH-10:IF HH<2 AND HH>-6 THEN H
H=2
3010 SOUND 0,200,10,10
3020 SOUND 0,0,0,0:RETURN
9999 END
```



VIC-20

BY IVOR STONES

RUNS IN 3.5K ON A VIC-20

POT

Not just anybody can get served in the Computer & Video Games City Saloon.

Newcomers are challenged to prove that they are good enough to drink with the other games players. The only way to prove what a games player's gotta prove, is by demonstrating your nerve and reactions in a few rounds of Pot Shot.

The bar tender will fill your glass and slide it along the bar top to you. It will go over the edge and fall to the floor. You must fire at just the right moment to hit the glass as it falls.

When you score six hits in one round, the game becomes harder and you have to hit just the handle for all subsequent rounds.

Don't worry about the bar bill, as many drinks as you want will be provided by your landlord, Vic!

Pot Shot is one of those deceptively simple but compulsive games. The graphics show just what can be obtained using the VIC-20's built-in character set.

Aspiring games writers would do well to note how well Pot Shot puts 10 of the golden game rules into practice:

1) It is visually novel.

2) As a reaction game it is hard but not so hard that maximum scores cannot be obtained.

3) As the player improves the game automatically gets harder.

4) The rules are easy to understand and are printed in an interesting way.

5) The game does not require constant resetting by the player-so no interruptions.

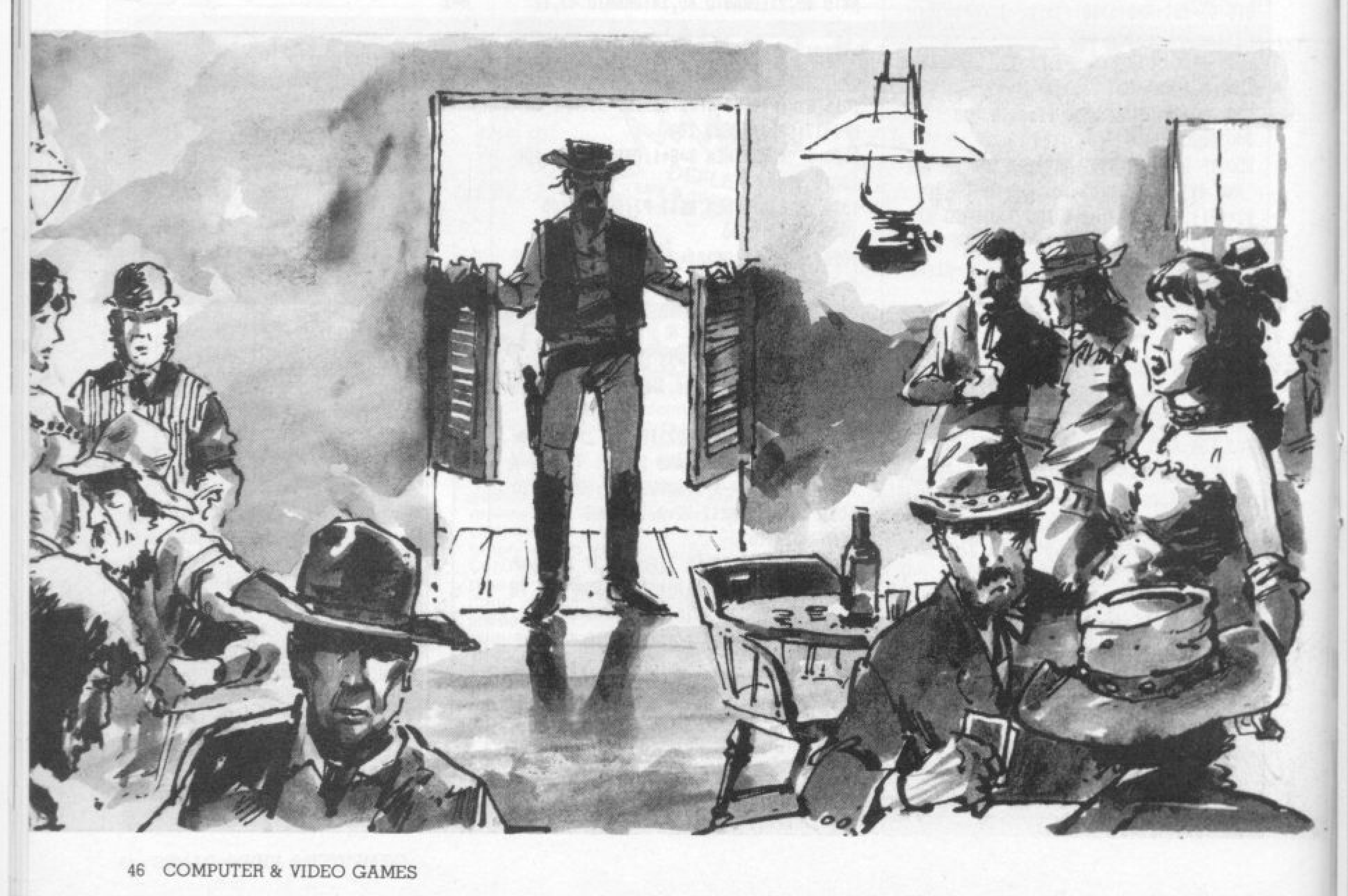
6) If no keys are pressed the "attract mode" shows game operation.

7) Appropriate sound effects add to the overall impact.

8) Complicated character strings have been put in as data statements and odd symbols have been kept to a minimum to aid entry by readers.

9) Key program sections indicated by REMarks.

10) The game makes the most of the computer's facilities and memory.



"SHOT"

```
0 REM VIC POT SHOT
1 REM (C) I A STONES..MR.MICRO LTD
2 REM P.O.BOX24.SWINTON.MANCHESTER.M273AL
3 AA=73:BB=160:CC=103
5 RESTORE:SC=0
7 POKE36879,25:REM SCREEN COLOUR
9 SO=36876:V=36878:REM SOUND & VOL.
11 REM DATA FOR A$
13 A$="":FORI=1TO27:READA:A$=A$+CHR$(A):NEXT
15 DATA18,158,46,17,157,157,146,172,18,32,17,157,203,17,157,146,28,223,18,223
17 DATA17,157,157,169,146,169,144
19 REM DATA FOR G$
21 G$="":FORI=1TO35:READA:G$=G$+CHR$(A):NEXT
23 DATA144,175,18,17,157,162,162,162,164,164,164,145,157,146,172,17,17
25 DATA157,157,157,205,203,18,32,223,146,17,157,157,157,163,223,18,32,146
27 REM DATA FOR B$
29 B$="":FORI=1TO12:READA:B$=B$+CHR$(A):NEXT
31 DATA31,167,17,157,167,164,165,157,145,157,167,201
33 REM DATA FOR C$
35 C$="":FORI=1TO25:READA:C$=C$+CHR$(A):NEXT
37 DATA31,145,32,32,32,17,157,157,157,167,17,157,167,18,32,146,32,32,145,157,15
7
39 DATA157,167,201,32
41 A=7680:B=22:E=A+19*B+12:F=0
45 PRINT"[CLR]";
47 PRINT"    [RVS]C[OFF]&[RVS]V[OFF].[RVS]G[OFF] CITY SALOON"
49 FORGAME=1TO6:R=0
51 D$="[CTRL CHARS]"
53 Z$="[DOWN x22]"
55 PRINT"[HOME][DOWN x3]"TAB(19)A$
57 PRINTTAB(17)B$
59 IFSC=0THENPRINT"[CTRL CHARS]":FORI=1TO6:PRINT"  ■";:NEXT:PRINT:PRINT" ";
61 IFSC=0THENFORI=1TO6:PRINT"[CTRL CHARS]";:NEXT:PRINT
63 IFSC=0THENPRINT"[GRAPHICS]"
65 PRINTLEFT$(Z$,11)"       [GRAPHICS]                "
67 PRINT"            [GRAPHICS]"
69 PRINT"            [GRAPHICS]"
71 PRINT"            [GRAPHICS]"
73 PRINT"            [GRAPHICS]"
75 PRINT"            [GRAPHICS]"
77 PRINT"            [GRAPHICS]"
79 PRINT"            [GRAPHICS]"
81 PRINTLEFT$(Z$,19)TAB(13)G$:J=1
83 IFH<1THENGOSUB183
84 REM FILL GLASS
85 POKEV,8:FORI=128TO240:POKESO,I:POKESO-1,I
87 IFI/8=INT(I/8)THENPRINTLEFT$(Z$,10)TAB(18)MID$(D$,J,1);:J=J+1
89 NEXT:POKESO,0:POKEV,0:POKESO-1,0
91 POKE198,0:REM CLEAR KEYBOARD BUFFER
93 PRINTTAB(19)"■ "
94 REM MOVE GLASS ←
95 FORI=17TO0STEP-1:PRINT"[HOME][DOWN x9]"TAB(I)C$:GOSUB141:IFI=13THENGOSUB123
97 NEXT
98 REM MOVE GLASS DOWN
99 FORI=1TO13:PRINTLEFT$(Z$,I+9)C$"[GRAPHICS]":GOSUB141:NEXT:PRINTLEFT$(Z$,22)"   "
101 PRINTZ$"[GRAPHICS]";
103 POKEE-2+F,32
```



continued on page 49

An education in computers starts with you!

There is another side to microcomputing, just as interesting as games; especially if you are a responsible parent or a teacher with responsibility for teaching computing or using computers as teaching aids. Computers in Education is an important and expanding field the implications and potential is only just beginning to be realised. If you have children, or are a teacher you have a responsibility to keep yourself informed of developments in this area. Educational Computing is written for you.

Every issue is packed with useful and up to date information covering product news, conference news, opinions, advice application stories, case studies and a forum for you to discuss your concerns and interests.

Each month we select a specific applications area. In the past we have looked at such subjects as Mathematics, Home Economics, Business Studies and Engineering. In the coming months we will be looking at Social Sciences, English, Computer Science and History.

We show the many interesting ways people are using computers as teaching aids. And give practical advice and guidance.

Educational Computing also publishes comprehensive surveys that are packed with the kind of information you need to know. In the past we have looked at systems costing less than £600, Educational software, courses and training.

If you are a teacher, the nature of your job and the responsibilities that go with it demand that you keep yourself informed of current affairs — and little is going to affect you, your colleagues and your students in this respect as much as computers.

I enclose a cheque for £6.50 (U.K.); Europe £12; non-Europe £14. Ten issues a year. Cheques should be made payable to Educational Computing.

Name ______________________

Position ______________________

Establishment ______________________

Address ______________________

____

____

Signed ____________ Date ____________

NOW POST PLEASE TO: *Educational Computing*, 8 Herbal Hill, London EC1 5JB

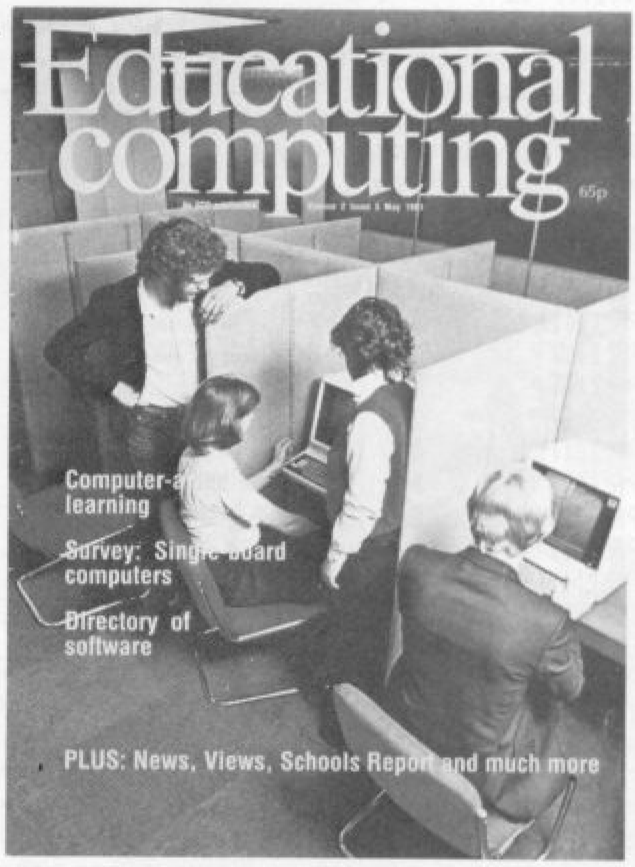
If you are a responsible parent you will want to know what your children are being taught in schools about the new technology. Many parents are diligent members of their local PTA. From January we shall carry a regular feature looking at the many ways PTAs have helped schools raise money for computers, peripherals and software.

The best way of keeping yourself directly informed is to subscribe to Educational Computing.

Stop Press

Special notice : Special notice : Special notice : From the January issue onwards Educational Computing will publish the official newsletter of MEP (Micro-electronics in Education Project) all the latest details of their activities will be available. So make sure you take out your subscription now.

Simply fill out the form.



Educational Computing

the magazine looking to the future.

POTSHOT

Continued from page 47



```
 104 REM SMASH GLASS
 105 F$="▬▬▬▬▬▬________________"
 107 POKEV,15:POKE36877,200
 109 FORI=1TO16:PRINTMID$(F$,I,1);:POKEV,16-I:FORJ=1TO200:NEXT:NEXT
 111 POKE36877,0
 113 PRINTZ$"┓   "
 115 PRINT"___________________┓":FORJ=1TO200:NEXT:PRINT"                    ┓"
 117 GOSUB131
 119 F=0:H=1:NEXTGAME
 121 GOTO173
 122 REM SUB TO MOVE ARM
 123 PRINT"▒QQQQQQ"TAB(19)"▒▒/■ "
 125 PRINTTAB(18)"▒ ■ "
 127 PRINTTAB(16)"▒▒▒ ▒▒ ▒ "
 129 PRINTTAB(19)"▒ ■":RETURN
 131 PRINT"▒QQQQQQ"TAB(19)"   "
 133 PRINTTAB(18)"   "
 135 PRINTTAB(16)"      "
 137 PRINTTAB(19)"    ":RETURN
 139 RETURN
 141 IFF<0THEN147
 143 REM TEST FOR SPACE BAR
 145 GETK$:IFK$<>" "THENFORJ=1TO20:NEXT:RETURN
 147 F=F-1:IFF=-11THENF=0:RETURN
 149 IFF<-2THENPOKE36877,0:POKEV,0:GOTO153
 151 POKE36877,190:POKEV,15
 152 REM CHECK IF HIT
 153 P=PEEK(E-2+F):IFR=1THENRETURN
 155 IFP=AAORP=BBORP=CCTHENGOSUB161:R=1:RETURN
 157 POKEE-2+F,119:POKEE-2+F+30720,0:POKEE-1+F,32:POKE8098,32
 159 RETURN
 160 REM HIT
 161 SC=SC+1:FORJ=1TO2*SC:POKEA+3*B+J,32:NEXT
 163 FORJ=1TO2*SC:POKEA+4*B+J,32:NEXT
 165 FORZ1=1TO5
 167 POKEV,15:FORZ=200TO230:POKESO,Z:NEXT:FORZ=230TO200STEP-1:POKESO,Z:NEXT:POKE
SO,0
 169 NEXTZ1
 171 RETURN
 172 REM PRINT SCORE
 173 PRINT"▒▒YOU GOT"SC"▮ OUT OF 6 "
 175 IFSC=6THENPRINT"▒SHARPSHOOTER":PRINT"DO I TAKE IT YOU DON'TWANT A DRINK?"
 177 FORI=1TO8000:NEXT:H=1:IFSC=6THENBB=AA
 179 IFSC=6ANDBB=AATHENCC=AA
 181 GOTO5
 182 REM INSTRUCTIONS
 183 READX$:IFX$="#"THENRETURN
 185 FORI=1TOLEN(X$)
 187 PRINT"▒Q"TAB(20)MID$(X$,I,1)
 189 PRINT"▒Q▮"CHR$(20):FORDELAY=1TO100:NEXT
 191 NEXTI:GOTO183
 193 DATA"▒VIC POT SHOT■","      THE BAR TENDER WILL POUR YOU A DRINK,"," AND "
 195 DATASLIDE IT ALONG THE BAR TOP... YOU MUST SHOOT THE GLASS ....BEFORE IT HI
TS
 197 DATA" THE FLOOR ...USING THE SPACE BAR TO FIRE......FOLLOWING 6 HITS "
 199 DATA"IN A ROW, THE GLASS WILL ONLY BREAK IF THE BULLET STRIKES THE HANDLE..
"
 201 DATA"...YOUR FIRST DRINK IS COMIN' UP                                    "
 203 DATA"#"
READY.
```

'ROUND THE HORN RUNS ON THE TRS-80 LEVEL II 16K. BY GEORGE BLANK

'ROUN
HO

The Horn, where our world's two mightiest oceans rage against one-another, long ago wrote its own stormy passages into seafaring lore.

Its unpredictable racing currents, heaving swell and treacherous rocks and reefs, have littered the bleak coastline at the foot of South America with many wrecks.

But in the mid 19th Century the rich pickings to be made by North American clippers made captains risk their vessels and sailors, their lives, once again in the race to be fastest 'Round the Horn.

George Blank has recreated the golden age of the clippers and their most hazardous route in this computerised test of seamanship — a race between three ships from New York to California.

The discovery of gold at Sutter's Mill in 1849 triggered a hurried migration to California that lasted for several years. While few prospectors struck it rich, many shippers did by shipping men and supplies to California.

The highest freight and passenger rates went to the fastest ships, and three of the fastest were the Surprise, the Flying Cloud and the Challenge.

The Surprise was owned by A. A. Low and Brother, and her captain was Phillip Dumaresq. This clipper, displacing 1261 tons, sailed in December of 1849 on a record breaking run to San Francisco of 96 days, 15 hours.

The high demand for fast shipping, not only in the California trade but in the trans-Atlantic trade to Liverpool and the China tea and spice trade as well, led to the golden age of the clipper ship. Two of the greatest were launched within weeks of each other in 1851, and raced to California amidst great publicity. They were the Flying Cloud and the Challenge.

The Flying Cloud, owned by Grinnel, Minturn and Company, was captained by Josiah Cressy. This ship of 1782 tons left on June 2, 1851 and set a new record for the California trade of 89 days and 21 hours. This record stood for several years, partly due to stormy weather that moved the ship to record breaking speeds of over 300 miles a day several times. (The ship did suffer damage to her masts and rigging.)

The Challenge sailed a few weeks later and ran into very calm weather, leading to a disappointing but still impressive time of 108 days. Captained by Bob "Bully" Waterman, the Challenge was the largest ship of her day at 2006 tons and was owned by N. L. & G. Griswold.

This computer program tampers with history a little to allow the three ships to sail from New York on the same day on a race to San Francisco. You will captain one of the ships and attempt to find favourable winds and currents that will allow you to get to San Francisco first. It is by no means certain you will arrive in San Francisco. The passage around Cape Horn is dangerous, and many vessels were wrecked there. If you try to sail through the doldrums at an angle and have bad luck, you could spend months right there.

The computer will display a map of North and South America, with New England indicated by the letter N and San Francisco by the letter S. Your position will be indicated by an exclamation mark, and that of the other vessels by the first letter of their name, assuming that they are not in the same square.

To win, all you have to do is sail your ship into the square containing the S in the fewest days. As soon as

NOTICE TO MARINERS

1) Observe special caution in Long Island Sound, Eastern U.S. coast at 40 degrees north latitude. Onshore current is treacherous, especially when combined with southerly winds.

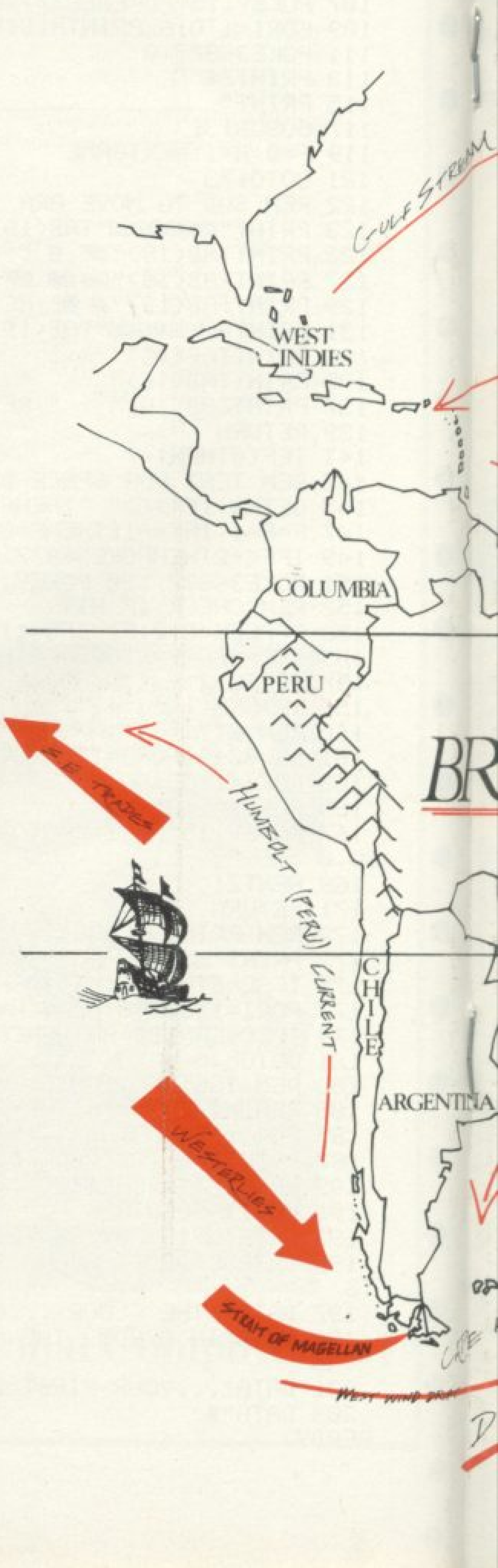
2) The Cape Horn Passage is extremely dangerous. For safe passage, remain south of 55 degrees, 30 minutes until longitude 72 degrees west and south of 46 degrees latitude until longitude 84 degrees west. Dangerous polar ice is virtually certain south of 64 degrees south latitude.

3) The Caribbean Sea contains many unmarked reefs and is especially hazardous without local knowledge.

4) Vessels are advised to maintain good distance from the northeast coast of South America. Light winds and flat calms, combined with unfavourable currents, make long delays likely.

5) Vessels bound for California are advised to set course well west of the southern coast of Mexico. Light winds make delays likely.

6) Beware of all capes. Reefs often project out from them and make sudden shipwreck likely. (Computer only checks for land due north, east, south, and west. If you approach a cape from the northeast, for example, you will run aground before any land is displayed.)



ND THE
ORN



OCEAN CURRENTS

NAME	NORTH-SOUTH	WEST-EAST
Japan current	48N-32N	132W
Japan current	32N-19.2N	129W-114W
Gulf Stream	48N-32N	39W
Gulf Stream	32N-19.2N	63W
Canaries current	48N-28N	39W
N. Equa. current	19.2N-8N	—
Guinea current	8N-0	24W
S. Equ. current	0-9.2S	—
Humbolt current	9.2S-27.6S	102W
Brazil current	9.2S-27.6S	48W
Benguela current	9.2S-27.6S	9W
West wind drift	44.2S-64.4S	—

NAME	DIRECTION	SPEED (KNOTS)
Japan current	South	1
Japan current	South	.7
Gulf Stream	ENE	1.9
Gulf Stream	North	1
Canaries current	SSW	1
N. Equ. current	West	1.2
Guinea current	East	1.3
S. Equ. current	West	2.1
Humbolt current	North	1.8
Brazil current	South	1.5
Benguela current	North	2
West wind drift	West	2.2

CLIMATIC REGIONS

NAME	SOUTHERN LIMIT	TYPICAL WINDS
Horse Latitudes	32N	Strong and variable
Northeast Trades	8N	Moderate from Northeast
Doldrums	3S	Calm and variables
Southeast Trades	28S	Moderate from Southeast
Roaring Forties	64S	Strong and Westerly

you enter any point in that square, the computer will print an arrival notice.

You will begin each turn by indicating the course you wish to sail. While the computer asks for a number, it will also respond to "N", "E", "S", and "W" for North, East South, and West.

Once you have entered a course, the computer will display your ship, the ocean, any land in sight from the bow, and your fore topmast staysail. The size and position of your sail will indicate the tack you are on. The wind comes across the side of your ship opposite the sail. The three sizes of sail indicate that you are close hauled, (sailing into the wind) on a reach, (wind coming from the side) or running, (wind at your back). The larger the sail, the faster you are going.

Ships cannot sail directly into the wind, and yours is no exception. In fact, it will not sail closer than 45° to the direction from which the wind is coming. The computer will automatically change your course if the wind shifts against you, and change it back when the wind changes back. Should you wish to make a course correction, you may press "Z" for a 22.5° turn to starboard (right for you landlubbers) or "/" for a turn to port. You will find it especially helpful to keep one finger on the "Z" and one on the "/" when you are making the passage around Cape Horn.

In the centre of the screen, directly above the waves, the computer will display any land that is in sight. Don't count on seeing land before you run aground! Sometimes you will see it in time and sometimes not. It is safer (but sometimes slower) to stay away from the coast completely.

There are some navigational aids provided by the computer. You have a compass in the centre of the ship, and a nameplate under it. When the computer accepts a course change, it will display "PORT" or "STARB'D" where the nameplate is.

At the bottom left is information on the direction the wind is coming from and the windspeed. The bottom right displays the ship's calendar and your last navigation position. Expert players will want to depend on this latitude and longitude display extensively, for the map and land displays give only a rough indication. As a help to players, I have enclosed a table of ocean currents, a table of climatic regions, and some notices to mariners, all of which relate to the latitude and longitude.

Landlubbers may assume that a ship will sail in the direction she is pointed, but "it ain't necessarily so".

Two other factors affect your course: leeway and current. Leeway is the result of the wind blowing you off course in the direction it is blowing. Current carries you in the direction the water is flowing.

Weather is also a factor, but there is a trick to it: the computer only checks the region at the beginning of each turn. So, you can wait just north or south of the Doldrums for a good wind, and possibly get completely across without getting stuck. If you think this is cheating enter this line in your program:

1110 GOSUB 7000:GOSUB 7600

The region will then be checked on each half-day, but the game may take longer.

```
10 REM ! AROUND THE HORN !
20 REM ! COPYRIGHT 1978 GEORGE BLANK LEECHBURG PA 15656 !
30 GOSUB 3000
99 'INITIALIZE
100 CLEAR 600
110 DIM D(3):DIM E(3,4):DIM H(15):DIM L(16,3):DIM N(3,12):DIM S(
3,2):DIM T(3,2):DIM V(15):DIM W(5,4)
120 DIM D$(15)
130 FOR A=0TO15:READ D$(A):READ H(A):READ V(A):NEXT
140 FOR A=1TO3:READ C$(A):NEXT
160 W$(0)=":.::,..,..:::;,..,::;:,...,::;;::,..::..,:;:,."
```

```
170 W$(1)=LEFT$(W$(0),16):W$(2)=MID$(W$(0),3,16):W$(3)=MID$(W$(0
),6,16):W$(4)=MID$(W$(0),9,16):W$(5)=RIGHT$(W$(0),16)
190 FOR A=1TO3:N(A,1)=35:N(A,2)=1.1:N(A,3)=99:N(A,4)=1:N(A,5)=1:
NEXT
200 FOR A=1TO5:W(A,1)=29+RND(100)/100:NEXT
210 W(1,1)=W(1,1)+1:W(3,1)=W(3,1)-1
220 FOR A=1TO3:N(A,8)=W(1,1):NEXT
300 CLS:PRINT
310 PRINT"CLIPPER - A RACE AROUND THE HORN TO CALIFORNIA IN 1852
"
320 PRINT:PRINT"HOW MANY PLAYERS (1 TO 3) ?"
330 A$=INKEY$:IF A$="" THEN 330 ELSE P=VAL(A$)
340 IF P<1 THEN P=1
350 IF P>3 THEN P=3
360 IF P<3 THEN N(3,0)=-10
370 IF P=1 THEN N(2,0)=-10
380 PRINT P;"PLAYER";:IF P>1 THEN PRINT"S";
390 PRINT
999 'CONTROL ROUTINE
1000 IF N(1,0)=-10 AND N(2,0)=-10 AND N(3,0)=-10 THEN 2300
1010 GOSUB 7500
1020 FOR C=1TOP
1025  IF N(C,0)=-10 THEN 1170
1030  GOSUB 7000:GOSUB 7600:GOSUB 7700
1040  GOSUB 9000
1050  GOSUB 8000
1060  FOR CL=1TO14
1062   IF WR=1 THEN 1150
1065   GOSUB 8200
1070   GOSUB 8040
1075   GOSUB 8200
1080   GOSUB 2060
1085   IF INT(CL/2)=CL/2 THEN D(C)=D(C)+1
1090   GOSUB 8300
1100   GOSUB 8200
1120   GOSUB 7700
1130   GOSUB 8200
1140   GOSUB 8400
1150   NEXT CL
1160 WR=0
1170 NEXT C
1190 GOTO 1000
1999 'NEW LOCATION
2000 R=N(C,4):T=0:N(C,0)=N(C,12)
2009 'PORT TACK
2010 IF N(C,0)>N(C,11) THEN T=N(C,0)-N(C,11):T(C,2)=2:IF T=1 THE
N T=2:N(C,0)=N(C,0)+1
2019 'STARBOARD TACK
2020 IF N(C,0)<N(C,11) THEN T=N(C,11)-N(C,0):T(C,2)=1:IF T=1 THE
N T=2:N(C,0)=N(C,0)-1
2025 IF N(C,0)>15 THEN N(C,0)=0
2030 IF T=0 THEN N(C,0)=N(C,0)-1:GOTO 2020
2035 IF N(C,0)<0 THEN N(C,0)=16+N(C,0)
2040 IF T>8 THEN T=16-T
2050 IF T>1 THEN M=.6:T(C,1)=1:IF T>3 THEN M=1:T(C,1)=2:IF T>5 T
HEN M=1.2:T(C,1)=3
2052 IF T(C,1)<>S(C,1) OR T(C,2)<>S(C,2) THEN GOSUB 2500
2055 M=M*N(C,5)*N(C,10)/8:GOTO 8050
2060 D=N(C,0):H=N(C,1):V=N(C,2):L=W(R,4)+8:IF L>15 THEN L=L-16
2070 H=H+(H(D)*M)/6+H(L)/600*N(C,10)+N(C,6)/30
2080 V=V+(V(D)*M)/10+V(L)/1000*N(C,10)+N(C,7)/50
2085 GOSUB 2400
2090 N(C,1)=H:N(C,2)=V:N(C,3)=INT(V)*64+INT(H)
2100 IF N(C,3)=145 THEN 2600
2190 RETURN
2200 CLS
2210 PRINT
2220 PRINT"SOS ...---... SOS ...---... SOS"
2230 PRINT
2240 PRINT" S H I P W R E C K !"
2250 PRINT
2260 PRINT"THE CLIPPER ";C$(C);" WAS LOST AT SEA WITH ALL HANDS"
2265 GOSUB 2700
2270 N(C,0)=-10:E(C,1)=2:E(C,2)=H:E(C,3)=V:E(C,4)=D(C):N(C,3)=99
2275 PRINT"LAST REPORTED POSITION ";:PRINT USING F$;LA;:PRINT US
ING G$;LO
2280 FOR A=1TO2000:NEXT A
2290 WR=1:RETURN
2299 'END OF GAME
2300 CLS:PRINT:PRINT" G A M E   O V E R":PRINT
2310 FOR C=1TOP
2320  IF E(C,1)=2 THEN 2350
2330  PRINT"THE CLIPPER ";C$(C);" SAILED TO SAN FRANCISCO IN";E(
C,4);"DAYS"
2340  PRINT:GOTO 2370
2350  PRINT"THE ";C$(C);" WAS LOST AT SEA AFTER";E(C,4);" DAYS"
2360  H=E(C,2):V=E(C,3):GOSUB 2700:PRINT"NEAR ";:PRINT USING F$;
LA;:PRINT USING G$;LO
2365 PRINT
2370 NEXT C
2380 INPUT"(PRESS ENTER FOR NEW GAME)";A$
2390 RUN
2400 B$="### DAYS ":PRINT@ 951,"";
2410 PRINT USING B$;D(C);
2420 GOSUB 2700
2430 PRINT@ 1005,"";
2440 PRINT USING F$;LA;
2450 PRINT USING G$;LO;
2490 RETURN
2500 IF S(C,2)=T(C,2) THEN 2540
2510 IF S(C,2)=2 THEN X=6*S(C,1)+1:FOR B=15392TO15904 STEP 64:FO
R A=B+1 TO B+X:POKE A,128:NEXT A:X=X+1:NEXT B
2520 IF S(C,2)=1 THEN X=6*S(C,1)+1:FOR B=15392TO15904 STEP 64:FO
R A=B-X TO B-1:POKE A,128:NEXT A:X=X+1:NEXT B
2530 GOTO 8050
2540 IF T(C,1)>S(C,1) THEN 2530
2550 IF T(C,2)=2 THEN X=6*S(C,1)+9:Y=6*T(C,1):FOR B=15392TO15904
 STEP 64:FOR A=B+Y TO B+X:POKE A,128:NEXT A:Y=Y+1:NEXT B
2560 IF T(C,2)=1 THEN X=6*S(C,1)+9:Y=6*T(C,1):FOR B=15392TO15904
 STEP 64:FOR A=B-X TO B-Y:POKE A,128:NEXT A:Y=Y+1:NEXT B
2570 GOTO 8050
2600 CLS:PRINT
2610 PRINT"THE CLIPPER ";C$(C);" HAS JUST ARRIVED IN SAN FRANCIS
CO"
2620 PRINT"AND IS UNLOADING CHOICE EASTERN MERCHANDISE AT THE WH
ARF.":PRINT
2630 PRINT"  THIS FAST SHIP,";D(C);" DAYS OUT OF NEW YORK, IS NO
W"
2635 PRINT"BOOKING PASSENGERS AND FREIGHT FOR NEW YORK."
2640 E(C,1)=1:E(C,4)=D(C):N(C,0)=-10
2650 PRINT:PRINT"TOUCH ANY KEY TO CONTINUE"
2660 A$=INKEY$:IF A$="" THEN 2660
2690 GOTO1000
2700 IF V>6 THEN 2740
2710 F$=" ##.## N "
2720 LA=(6-V)*8.2
2730 GOTO 2760
2740 F$=" ##.## S "
2750 LA=(V-6)*9.2
2760 G$=" ###.## W"
2770 LO=174-H*3
2790 RETURN
2999 ' INSTRUCTIONS
3000 CLS:PRINT
3010 PRINT"   THIS GAME SIMULATES A CLIPPER SHIP RACE AROUND THE
 HORN"
3020 PRINT"DURING THE CALIFORNIA GOLD RUSH. tHE FIRST PERSON TO
GO"
3030 PRINT"FROM NEW YORK (N) TO SAN FRANCISCO (S) WINS."
3040 PRINT:PRINT"    TO SAIL YOUR SHIP, AT THE BEGINNING OF A TU
RN, ENTER"
3050 PRINT"YOUR INTENDED COURSE AS DIRECTED. IF YOU WANT TO CHAN
GE"
```

continued on page 55

```
3100 PRINT"COURSE DURING A TURN, PRESS /   (OR S) FOR A TURN TO"
3110 PRINT"STARBOARD (RIGHT) OR PRESS Z  (OR P) TO TURN TO PORT
(LEFT).":PRINT
3230 PRINT"  ANTARCTIC ICE BEGINS AT 64.4 DEGREES SOUTH. CAPE HO
RN"
3240 PRINT"EXTENDS FROM 69 DEGREES WEST TO 74 DEGREES WEST AT 55
.5"
3250 PRINT"DEGREES SOUTH. IF YOU TOUCH ANY OF THESE BOUNDARIES O
R ANY"
3260 PRINT"OTHER LAND MASS, YOU WILL SHIPWRECK.":PRINT:INPUT"  (
PRESS ENTER)";A$
3270 CLS:PRINT:PRINT"   THE DOLDRUMS EXTEND FROM 8.2 DEGREES NOR
TH TO 2.8 DEGREES"
3280 PRINT"SOUTH. IF YOU FINISH A TURN IN THE DOLDRUMS, IT MAY T
AKE"
3290 PRINT"MONTHS TO GET OUT BECAUSE OF LIGHT WINDS."
3300 PRINT:PRINT"   THE COMPUTER CONSIDERS ANY POSITION BETWEEN
120 AND 123"
3310 PRINT"DEGREES WEST AND 24.6 TO 32.8 DEGREES NORTH TO BE A S
AFE"
3320 PRINT"ARRIVAL IN SAN FRANCISCO. YOUR POSITION IS AFFECTED B
Y"
3330 PRINT"WIND, CURRENT, LEEWAY, AND YOUR SAIL POSITION."
3520 PRINT"SEE AN ATLAS, GLOBE, OR NAVIGATION CHARTS FOR APPROXI
MATE"
3530 PRINT"DESCRIPTION OF WEATHER CONDITIONS AND CURRENT."
3540 PRINT:INPUT" (PRESS ENTER TO BEGIN)";A$
3550 RETURN
3999 'COMMANDS
4000 C$=INKEY$
4010 IF C$="Z" THEN C$="P"
4020 IF C$="P" THEN N(C,12)=N(C,12)-1
4030 IF N(C,12)<0 THEN N(C,12)=15
4035 IF C$="/" THEN C$="S"
4040 IF C$="S" THEN N(C,12)=N(C,12)+1
4050 IF N(C,12)>15 THEN N(C,12)=0
4060 IF C$="P" THEN PRINT@ 985,"    PORT    ";
4070 IF C$="S" THEN PRINT@ 985," STARBOARD  ";
4090 RETURN
4999 'SHORELINE
5000 D=N(C,0)
5010 ON D+1 GOSUB 5100,5110,5120,5130,5140,5150,5160,5170,5180,5
190,5200,5210,5220,5230,5240,5250
5020 PRINT@ 576,A$;
5090 RETURN
5100 A=DW:U=2:GOSUB 5700:A=DN:U=32:GOSUB 5700:A=DE:U=61:GOSUB 57
00:RETURN
5110 A=DN:U=16:GOSUB 5700:A=DE:U=58:GOSUB 5700:RETURN
5120 A=DN:U=10:GOSUB 5700:A=DE:U=54:GOSUB 5700:RETURN
5130 A=DN:U=6:GOSUB 5700:A=DE:U=48:GOSUB 5700:RETURN
5140 A=DN:U=2:GOSUB 5700:A=DE:U=32:GOSUB 5700:A=DS:U=61:GOSUB 57
00:RETURN
5150 A=DE:U=16:GOSUB 5700:A=DS:U=58:GOSUB 5700:RETURN
5160 A=DE:U=10:GOSUB 5700:A=DS:U=54:GOSUB 5700:RETURN
5170 A=DE:U=6:GOSUB 5700:A=DS:U=48:GOSUB 5700:RETURN
5180 A=DE:U=2:GOSUB 5700:A=DS:U=32:GOSUB 5700:A=DW:U=61:GOSUB 57
00:RETURN
5190 A=DS:U=16:GOSUB 5700:A=DW:U=58:GOSUB 5700:RETURN
5200 A=DS:U=10:GOSUB 5700:A=DW:U=54:GOSUB 5700:RETURN
5210 A=DS:U=6:GOSUB 5700:A=DW:U=48:GOSUB 5700:RETURN
5220 A=DS:U=2:GOSUB 5700:A=DW:U=32:GOSUB 5700:A=DN:U=61:GOSUB 57
00:RETURN
5230 A=DW:U=16:GOSUB 5700:A=DN:U=58:GOSUB 5700:RETURN
5240 A=DW:U=10:GOSUB 5700:A=DN:U=54:GOSUB 5700:RETURN
5250 A=DW:U=6:GOSUB 5700:A=DN:U=48:GOSUB 5700:RETURN
5700 Q=A*A
5710 IF Q>3 THEN 5790
5720 B=SQR(4-Q)
5730 X=ATN(B/A)
5740 IF X>2 THEN X=2
5750 X=INT(X*32)
5780 GOSUB 5800
5790 RETURN
5800 Y=U-X:Z=U+X
5805 IF A<1 THEN AA=10-10*A:Y=Y-AA:Z=Z+AA
5810 IF Y>64 AND Z>64 THEN 5890
5820 IF Y<1 AND Z<1 THEN 5890
5830 IF Y<1 THEN Y=1
5840 IF Z>64 THEN Z=64
5850 IF U<32 AND Z>U+8 THEN Z=U+8
5860 IF U>32 AND Y<U-8 THEN Y=U-8
5870 L$="[":IF V>3 THEN L$="&":IF V>7 AND H<32 THEN L$="#"
5875 IF V>10 AND A=DS THEN L$="-"
5880 GOSUB 5900
5890 RETURN
5900 A=Z-Y:B$="":FOR B=1TOA:B$=B$+L$:NEXT:AL$="":AR$=""
5910 AL$=LEFT$(A$,Y-1)
5920 AR$=RIGHT$(A$,64-Z)
5930 A$=AL$+B$+AR$
5990 RETURN
6999 'DETERMINE REGION AND OCEAN CURRENTS
7000 H=N(C,1):V=N(C,2):N(C,6)=0:N(C,7)=0:IF V>2.5 THEN 7100
7010 N(C,4)=1
7020 IF V<2 AND H>30 AND H<45 THEN N(C,6)=1.9:N(C,7)=-.2
7030 IF H>45 THEN N(C,6)=-.4:N(C,7)=.8
7040 IF H>14 AND H<18 THEN N(C,7)=1
7090 GOTO 7490
7100 IF V>5 THEN 7200
7110 N(C,4)=2
7120 IF V>3.6 THEN N(C,6)=-1.2:GOTO 7190
7130 IF H>15 AND H<20 THEN N(C,7)=.7
7140 IF H>32 AND H<37 THEN N(C,7)=-1
7190 GOTO 7490
7200 IF V>6.3 THEN 7300
7210 N(C,4)=3
7220 IF H>45 THEN N(C,6)=1.3
7290 GOTO 7490
7300 IF V>9 THEN 7400
7310 N(C,4)=4
7320 IF V<7 THEN N(C,6)=-2.1:GOTO 7390
7330 IF H<42 AND H>32 THEN N(C,7)=1.5
7340 IF H>48 THEN N(C,7)=-2
7350 IF H>24 AND H<31 THEN N(C,7)=-1.8
7390 GOTO 7490
7400 N(C,4)=5
7410 IF V>10.8 THEN N(C,6)=2.2:GOTO 7490
7420 IF H>27 AND H<37 THEN N(C,7)=-1.8
7430 IF H>37 AND H<41 THEN N(C,7)=1.4
7490 RETURN
7499 'WEATHER BY REGION
7500 W(1,2)=RND(6)-1:IF W(1,1)>30 THEN W(1,2)=-W(1,2)
7510 A=ABS(W(1,2)):W(1,3)=RND(7)*RND(A+1)+RND(15)-1:W(1,4)=RND(1
6)-1
7520 W(2,2)=RND(6)-1:IF W(2,1)>29.5 THEN W(2,2)=-W(2,2)
7530 A=ABS(W(2,2)):W(2,3)=RND(5)*RND(A+1):IF W(2,3)<10 THEN W(2,
3)=W(2,3)+RND(15)
7535 W(2,4)=2+RND(8)-RND(8):IF W(2,4)<0 THEN W(2,4)=W(2,4)+16
7540 W(3,2)=RND(3)-1:IF W(3,1)>29 THEN W(3,2)=NW(3,2)
7550 A=ABS(W(3,2)):W(3,3)=RND(3)*A+RND(3)-1:W(3,4)=RND(16)-1
7560 W(4,2)=RND(6)-1:IF W(4,1)>30 THEN W(4,2)=-W(4,2)
7570 A=ABS(W(4,2)):W(4,3)=RND(6)*A:W(4,4)=6+RND(8)-RND(8):IF W(4
,4)<0 THEN W(4,4)=15
7575 IF W(4,3)<10 THEN W(4,3)=W(4,3)+RND(21)-1
7580 W(5,2)=RND(3)+2:IF W(5,1)>29.7 THEN W(5,2)=-W(5,2)
7590 A=ABS(W(5,2)):W(5,3)=(3+RND(7))*A:W(5,4)=11+RND(8)-RND(8):I
F W(5,4)>15 THEN W(5,4)=W(5,4)-16
7595 FOR A=1TO5:W(A,1)=W(A,1)+W(A,2)/7:NEXT:RETURN
7599 'CURRENT PLAYER'S WEATHER
7600 R=N(C,4):N(C,8)=W(R,1)
7610 N(C,9)=W(R,2)/50
7620 N(C,10)=W(R,3)
```

continued on page 57

SILICON CENTRE

ATARI®

ACORN COMPUTER

EDINBURGH

MAIL ORDER

Price List, order form on request

ATARI 400 (16K)	£335
ATARI 800 (16K)	£625
ACORN ATOM (Kit)	£140
ACORN ATOM (ready built)	£174.50
VIDEO GENIE (16K)	£329
GENIE II (16K)	£385
VIC 20	£189.95
EPSOM AND SEIKOSHA PRINTERS	

Mattel Intellivision, Electronic Games, Chess, Software, Books, Accessories, etc.

SILICON CENTRE

21 Comely Bank Road, Edinburgh 4
Tel: 332 5277

BARCLAYCARD VISA

ACCESS

ELECTRONICS FOR THE 80s

Circle No. 121

ATARI APPROVED DEALER

ATARI 400 & 800

PERSONAL COMPUTER SYSTEMS

ATARI

IN MANCHESTER

✸ SOFTWARE ✸ PERIPHERALS
✸ COMPUTER CHESS GAMES

(FULL RANGE IN STOCK)

BARCLAYCARD VISA

Buy it with Access

MANCHESTER'S BEST ATARI DEALER

ATARI VIDEO COMPUTER SYSTEM

PUT YOURSELF ONTO OUR NEW ATARI CARTRIDGE INFORMATION MAILING LIST

ACTIVISION

FULL RANGE OF CARTRIDGES IN STOCK AT LOWEST PRICES!

SPECIAL MAIL ORDER SERVICE WRITE OR PHONE FOR FULL DETAILS

GE

Commodore VIC due shortly!

GEMINI ELECTRONICS

Dept. VG. 50 Newton St., Off Piccadilly,
Manchester M1 2EA. Tel: 061-236 3083.

WE ARE AT THE CORNER NEWTON ST./ HILTON ST.

Circle No. 122

1K ZX81 MINI SPACE INTRUDERS £5.95

Yes! Our machine language programmers have scored another first! Now you can play this super game on your 1K Sinclair ZX81. All the fun of the arcade game in the comfort of your own home.

HINTS & TIPS for the ZX81 £4.25

by Andrew Hewson

*80 pages explaining clearly how to squeeze a computing quart out of a Sinclair pint pot.
*Saving Space — vital reading for all ZX81 owners.
*Understanding the Display File — using the display file as memory, clearing a part of the display, using tokens in PRINT statements.
*Converting ZX80 programs — explaining simply but comprehensively how to convert the hundreds of published ZX80 programs.
*Chaining Programs — revealing techniques for passing data between programs, calling subroutines from cassette and establishing data files.
*Machine Code Programs — all you want to know about Z80 machine language. Explaining how to write, load, edit and save machine code and how to debug your routines.
Routines and programs are scattered liberally throughout the text and the final chapter consists of twelve useful, interesting and entertaining programs such as LINE RENUMBER, BOUNCER, SHOOT, STATISTICS etc.

Cassettes for 16K ZX81

SPACE INTRUDERS — fight the marauding alien as you battle to save the Earth. All the dynamic parts of this program are written in machine code for super fast fun **£6.50**
PROGRAMMERS TOOL KIT — line renumber including GOSUBs and GOTOs. Hexadecimal Loader/Printer, Find, Edit and Replace BASIC program strings **£8.50**

Cassettes for 1K ZX81

STATISTICS — Mean, standard deviation, regression, trend analysis, chi squared test, graph plot **£3.75**
PLANET LANDER + space docking, clock, stopwatch **£3.75**

780 Op Codes — this handy ready reckoner lists all 600 plus, Z80 machine codes in decimal and hexadecimal with their mnemonics. Each code is succinctly explained and cross referenced. Complete with protective transparent wallet **£2.00**

BLANK C12 CASSETTES 5 for £2.75, 25 for £13.25

Send SAE for full catalogue

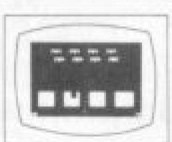
Cheque with order or quote Access number to:
HEWSON CONSULTANTS, 7 GRAHAME CLOSE, BLEWBURY, OXON OX11 9QE. TEL: (0235) 850075

Circle No. 123

MACRONICS

ZX81 26 Spiers Close, Knowle, Solihull, West Midlands, B93 9ES England **ZX80**

1K Space Invaders



A superb version of the famous arcade game in fast interactive graphs. A 4 x 2 array of aliens descend moving right & left and they can detect your Laser Base so keep it on the move. Previous and current game 'On screen' scoring. Destructable protective shields and keyboard control of the Laser Base & Laser Bolt firing using ⇦ & ⇨ and the 'Rubout' key.

1K Breakout



An interactive graphs. 9 ball game, as Invaders written in m/c for good graphs. Try your skill and patience at knocking all bricks from the wall. Use ⇦ & ⇨ to control the paddle.

1K Music



From a range of 8 notes you can use your ZX as a toy piano. Your selected notes are written to cassette – continous prompt for new selection of notes – play back your cassette and just listen to it sing. Example tunes.

Please specify 4k ROM or 8k ROM m/c when ordering.

Introductory Offer for 1K ZX machines
3 cassettes & program listings for ONLY £6·95!!

Lots more software for all ZX machines from 1K-16K.
Send S.A.E. for catalogue.

Circle No. 124

```
7630 N(C,11)=W(R,4)
7690 RETURN
7699 'HOURLY CHANGE IN WEATHER
7700 N(C,8)=N(C,8)+N(C,9)
7710 N(C,10)=N(C,10)+RND(3)-2:IF N(C,10)<0 THEN N(C,10)=0
7720 IF N(C,8)<28 AND N(C,9)<-.09 THEN N(C,10)=N(C,1)+RND(5):A=R
ND(12):IF (A+CL)>10 THEN N(C,9)=-N(C,9)
7730 N(C,11)=N(C,11)+RND(3)-2
7740 IF N(C,11)>15 THEN N(C,11)=0
7750 IF N(C,11)<0 THEN N(C,11)=15
7790 RETURN
7999 'VIEW FROM BOW
8000 CLS
8010 FOR A=16128TO16382:POKE A,191:NEXT
8020 FOR A=16139TO16146:POKE A,128:POKE A+32,128:NEXT
8030 POKE 16095,190:POKE 16096,189
8040 GOTO 2000
8050 IF T(C,2)=1 GOSUB 8100
8060 IF T(C,2)=2 GOSUB 8150
8070 S(C,1)=T(C,1)
8080 S(C,2)=T(C,2)
8090 RETURN
8099 'SAIL FOR STARBOARD TACK
8100 X=6*T(C,1):FOR B=15392TO15904 STEP 64:FOR A=B-X TO B:POKE A
,191:NEXT A:X=X+1:POKE B-X,186
8110 NEXT B:RETURN
8149 'SAIL FOR PORT TACK
8150 X=6*T(C,1):FOR B=15392TO15904 STEP 64:FOR A=B TO B+X:POKE A
,191:NEXT A:X=X+1:POKE B+X,181
8160 NEXT B:RETURN
8199 'WAVES
8200 W=W+1:IF W=4 THEN W=1
8210 PRINT@ 640,W$(W);W$(W);W$(W);W$(W);
8220 W$(0)=LEFT$(W$(W+1),15)
8230 PRINT@ 704,W$(W+1);W$(0);:PRINT@ 737,W$(0);W$(W+1);
8240 W$(0)=LEFT$(W$(W+2),8)
8250 PRINT@ 779,W$(0);:PRINT@ 811,W$(0);
8260 GOSUB 4000
8290 RETURN
8299 'DATA DISPLAY
8300 D=N(C,0):PRINT@ 862,D$(D);
8310 PRINT@ 985,C$(C);
8320 PRINT@ 896,"WIND ";
8330 PRINT@ 960,D$(N(C,11));
8340 B$="### KNOTS "
8350 PRINT USING B$;N(C,10);
8390 RETURN
8399 'LAND TEST - C(0)=LAND NEARBY  1=N 2=E 3=S 4=W
8400 H=N(C,1):V=N(C,2):X=INT(H):Y=INT(V)
8410 DW=H:DN=V:DE=64-H:DS=13-V
8419 'NORTH BOUNDARY
8420 IF H<16 OR H>44 THEN 8550
8430 IF H<44 THEN DN=V-8
8435 IF H<42 THEN DN=V-9
8440 IF H<38 THEN DN=V-10
8450 IF H<35 THEN DN=V-12
8460 IF H<33.5 THEN DN=V-11
8465 IF X>30 AND X<34 THEN DN=V-11
8470 IF H<31 THEN DN=V-8
8475 IF H<29 THEN DN=V-6
8480 IF H<27 THEN DN=V-5
8485 IF H<20 THEN DN=V-(X-15)
8490 IF H<34 OR V>8 THEN 8550
8499 'EASTERN ATLANTIC
8500 IF X<44 THEN DN=V:DS=6-V
8505 IF X=39 THEN DN=V
8510 IF X<39 THEN DN=V-1
8520 IF X<35 THEN DN=V-2
8530 IF X>41 AND X<45 THEN DS=7-V
8549 'WEST COAST
8550 IF H>32 THEN 8600
8555 IF Y=12 THEN 8690
8560 IF Y<5 THEN DE=(15+Y)-H:GOTO 8690
8570 IF Y=11 THEN DE=33.5-H
8575 IF Y<11 THEN DE=31-H
8580 IF Y<8 THEN DE=29-H
8585 IF Y=5 THEN DE=27-H
8590 GOTO 8690
8599 'EAST COAST
8600 IF Y<12 THEN DW=H-36
8610 IF Y=9 THEN DW=H-38
8620 IF Y=8 THEN DW=H-42
8630 IF Y=7 THEN DW=H-44
8640 IF Y=6 THEN DW=H-43
8650 IF Y=5 THEN DW=H-36
8660 IF Y<5 AND Y>1 THEN DW=H-33.5
8665 IF Y=1 THEN DW=H-35
8670 IF Y=0 THEN DW=H-39
8680 GOSUB 8200
8690 FOR A=0TO4:C(A)=0:NEXT
8700 IF DN<2 THEN C(1)=1:C(0)=1
8710 IF DE<2 THEN C(2)=1:C(0)=1
8720 IF DS<2 THEN C(3)=1:C(0)=1
8730 IF DW<2 THEN C(4)=1:C(0)=1
8740 A$="":FOR A=1TO64:A$=A$+" ":NEXT:IF C(0)=0 THEN 8790
8750 GOSUB 8200:GOSUB 5000
8760 IF DN<0 OR DE<0 OR DS<0 OR DW<0 THEN 2200
8790 RETURN
8999 'MAP
9000 CLS:A=15360
9010 POKE A+16,162:FOR B=A+17TOA+33:POKE B,191:NEXT:POKE A+34,15
1:FOR B=A+35TOA+37:POKE B,143:NEXT:POKE A+38,142
9020 A=A+64:POKE A+17,139:FOR B=A+18TOA+32:POKE B,191:NEXT:POKEA
+33,159:POKE A+34,159
9030 A=A+64:POKE A+18,162:FOR B=A+19TOA+32:POKE B,191:NEXT:POKE
A+33,157
9040 A=A+64:POKE A+19,131:FOR B=A+20TOA+25:POKE B,191:POKE B+6,1
43:NEXT:POKE A+20,175:POKE A+21,175:POKE A+28,135:POKE A+32,175:
POKE A+33,145
9050 A=A+64:POKE A+21,133:POKE A+22,143:POKE A+23,143:FOR B=A+24
TO A+26:POKE B,191:NEXT:POKE A+33,130
9060 A=A+64:POKE A+26,139:POKE A+27,173:FOR B=A+29TOA+38:POKE B,
176:NEXT
9070 A=A+64:FOR B=A+28TOA+41:POKE B,191:NEXT:POKE A+42,180:POKE
A+43,144
9080 A=A+64:POKE A+28,138:FOR B=A+29TOA+43:POKE B,191:NEXT
9090 A=A+64:FOR B=A+31TOA+36:POKE B,191:POKE B+64,191:POKE B+128
,191:POKE B+5,191:NEXT:POKE A+41,143:POKE A+42,135
9100 A=A+64:POKE A+37,131
9110 A=A+64:POKE A+36,128
9120 A=A+64:POKE A+31,131:POKE A+32,191:POKE A+33,191:POKE A+34,
181:POKE A+35,148
9130 PRINT@ N(1,3),"C";:PRINT@ N(2,3),"F";:PRINT@ N(3,3),"S";:PR
INT@ 99,"N";:PRINT@ 145,"S";
9140 PRINT@ N(C,3),"!";
9150 PRINT@ 832, "CLIPPER ";C$(C);"    ";
9170 PRINT"WINDS ";D$(N(C,11));" AT";N(C,10);" KNOTS"
9230 PRINT@ 896,"1-N  2-NE  3-E  4-SE  5-S  6-SW  7-W  8-NW"
9240 PRINT@ 960,"CAPTAIN, WHAT HEADING DO YOU WISH (0-8)";
9250 A$=INKEY$:IF A$="" THEN 9250
9252 IF A$="N" THEN A$="1"
9253 IF A$="E" THEN A$="3"
9254 IF A$="S" THEN A$="5"
9255 IF A$="W" THEN A$="7"
9260 A=VAL(A$):IF (A<1)OR(A>8) THEN 9250
9270 N(C,12)=(A-1)*2
9490 RETURN
9999 GOTO 9999
10000 DATA " N ",0,-1,"NNE",.4,-.9," NE",.7,-.7,"ENE",.9,-.4
10010 DATA " E ",1,0,"ESE",.9,.4," SE",.7,.7,"SSE",.4,.9
10020 DATA " S ",0,1,"SSW",-.4,.9,"SW ",-.7,.7,"WSW",-.9,.4
10030 DATA " W ",-1,0,"WNW",-.9,-.4,"NW ",-.5,-.7,"NNW",-.4,-.9
10040 DATA " CHALLENGE  ","FLYING CLOUD","  SURPRISE  "
```

Space invaders in 1K cause plenty of headaches to a conscientious laser base determined to survive.

Tim Bull's Cosmax aliens come in four different varieties depending on the player's score. When you score above 1,000 points you find yourself up against a second generation alien.

Another mutation takes place at 2,000 points. The fourth variety are at liberty to drop on you at any time and being "semi-invisible" they carry a bonus of 50 points.

You are rewarded for an early strike on the descending creatures as they are worth 100 points to you at the top of the screen but only five if you leave them to the last moment.

To destroy the creatures you move your laser base so that one of its two guns, mounted at either end, is directly below the centre of the alien. The "1" key moves the base left and the "3" key moves it right.

To fire press the "0" key. The guns fire invisible laser rays when key is pressed.

Only one life in this game though and the first alien to hit your base puts an end to your score. Tim has some ideas which will help games writers working with limited memory.

In lines 10-30 the "VAL function is used to set up variables since it takes up less memory. Lines 50 to 80 determine which type of alien will come down the screen next. Note that the middle character between the quote in line 60 is a reversed quote character.

Line 90 determines the initial height of the alien and line 120 tests whether the alien is above one of the two laser base's guns and whether the "fire" button is being pressed — if both conditions are fulfilled control jumps to line 250.

Lines 130 and 140 move the laser base. 150 and 160 move the alien and keep it on the screen. Line 180 tests whether the alien has hit your laser base and line 200 prints an explosion and your score.

The variables used are A$ alien type; H, horizontal position of alien; P, position of laser base; S, score; V, vertical position of alien.

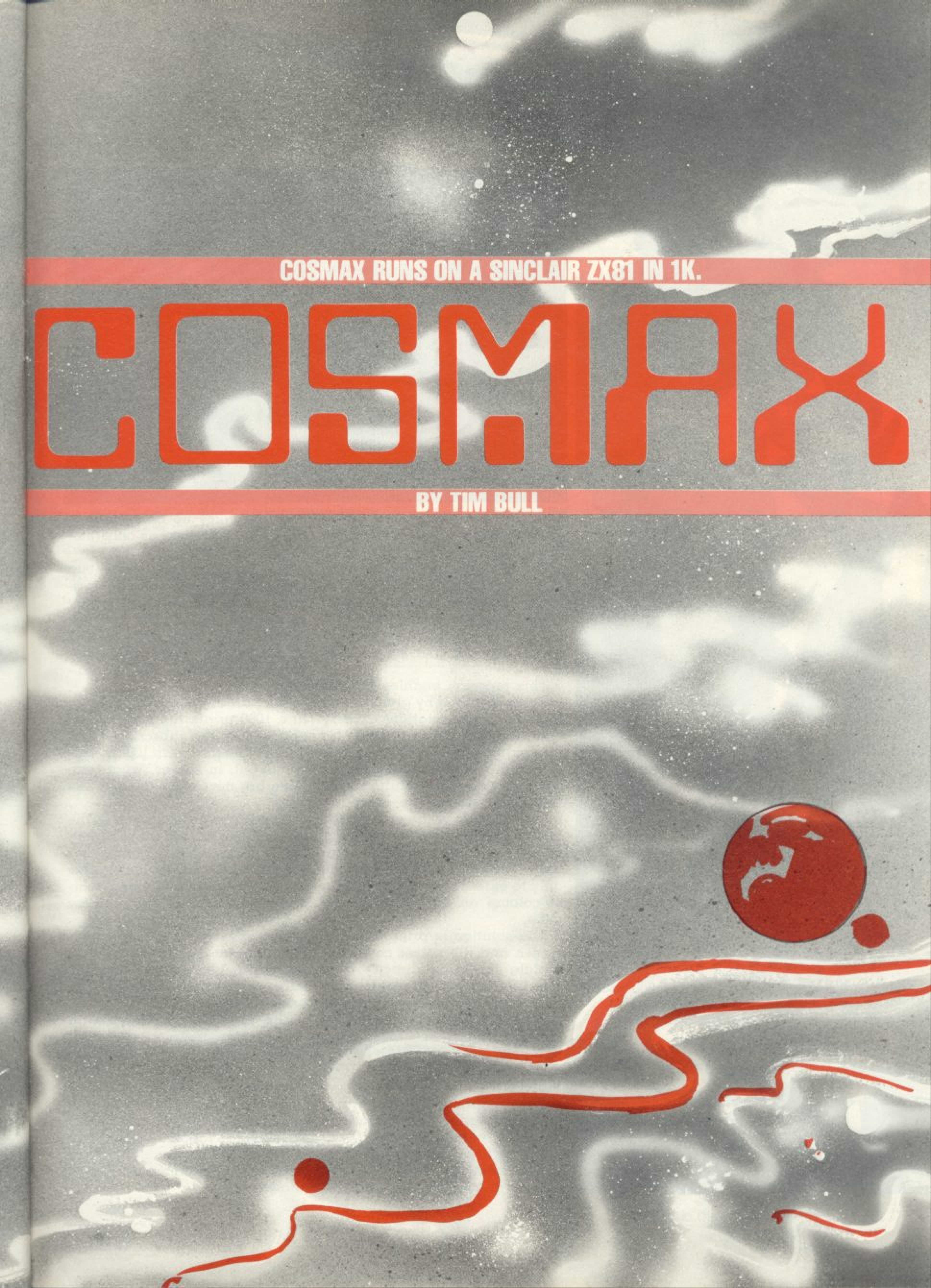
COSMAX program listing

```
  5 RAND
 10 LET K = VAL "2"
 20 LET S = VAL "0"
 30 LET P = VAL "8"
 40 LET H = INT (RND*18)
 50 LET A$ = "<V>"
 60 IF S> 1E3 THEN LET A$ =
   "▞▀▚"
 70 IF S> 2E3 THEN LET A$ =
   "▛▒▜"
 80 IF RND >·8 THEN LET A$ =
   ":  :"
 90 FOR V = INT(RND*15) TO 19
100 CLS
110 PRINT AT V, H-1; A$; AT
   20, P-K; "▟▞▒▚▙"
120 IF ABS (P-H) = K AND
   INKEY $="0" THEN GOTO 250
130 IF INKEY$ = "1" THEN LET
   P = P-(P>K)
140 IF INKEY$ = "3" THEN LET
   P = P+(P<15)
150 LET H = H+ INT(RND*3)-1
160 LET H = H+(H<K)-(H>16)
170 NEXT V
180 IF ABS (P-H)>3 THEN
   GOTO 40
190 CLS
200 PRINT AT 19, P-3; "X X X";
   AT 20, P-3; "XXXXXX"; AT 7, K;
   "GAME OVER"; S
210 PAUSE 40000
220 POKE 16437, 255
230 RUN
250 PRINT AT V, H-K;
   ">×⊠×<"
260 LET S = S+100-V*5+50*
   (CODE A$ = 14)
270 GOTO 40
```

COSMAX RUNS ON A SINCLAIR ZX81 IN 1K.

COSMAX

BY TIM BULL



THIS CUBE SOLVING PROGRAM RUNS IN 16K ON A 40 COLUMN PET

BY PETER AND MATTHEW RICHARDS

SOLVE THE CUBE!



Cubism is more popular today than Picasso would ever have thought possible.

But if watching 10-year-olds solve Mr. Rubik's little box of tricks on the T.V. screen in ever decreasing times, is getting you down, then go one better and tell people you got your Pet to solve it.

This program enables anyone to solve the cube by giving them a precise list of rotations to carry out. Rather than calling for information at various stages during the solution, the program issues a complete solution from the initial data. The computer holds the state of the entire cube as it manipulates it internally until it reaches the final solution. The would-be solver has only to enter the original pattern of colours on each face of the cube.

The solution is printed on the screen and the solver can manipulate the cube directly from this information. If required he can also have the list or rotations output to a standard printer by simply replying "yes" to the question "WILL YOU WANT THE SOLUTION TO BE OUTPUT TO A PRINTER?".

The program holds the state of the cube, after every move is made, in "percent" (integer) variables, namely E% and C%. This saves memory, since one element of a subscripted "percent" variable takes up only 2 bytes, but this is sufficient as only integers are involved.

The program itself takes up about 8K of RAM, but the variables bring the total of memory needed to about 11K. It was designed for Pets with Basic 2 or 3 but will also work on a Basic 4 machine with 40 columns.

The part of the program before line 1000 prints the instructions and sets up the subscripted variables. The part from 1000 to 4900 works out, in stages, what rotations are necessary to solve the cube.

As each stage is completed the instructions are put into a string, M$, and the program jumps to a subroutine at 5000 which prints out these instructions and rearanges the cube in the memory in preparation for the next stage. It then returns to the main part of the program and continues this procedure until it "sees" that the cube is finally complete and prints FINIS.

The program is written with the rotation instructions based on the suffixes "—1" and "2", but when it comes to printing out the instructions a notation based on lower case letters is used, as this is a more convenient notation for the solver to follow. The solution usually runs to about 100 rotations and a specimen printout is shown.

```
1 PP=0:POKE59468,12
2 PRINT"▯▯MAGIC CUBE SOLVER▮"
3 PRINT"▯COPYRIGHT P.N. & M.J. RICHARDS 1981"
4 PRINT"▯THIS PROGRAM WILL SOLVE THE MAGIC CUBE"
5 PRINT"PUZZLE FROM WHATEVER POSITION YOU ENTER"
6 PRINT"BY GIVING YOU PRECISE INSTRUCTIONS AS"
7 PRINT"TO WHICH FACES TO ROTATE."
8 PRINT"▯SELECT ANY FACE AS TOP. LABEL THE OTHER"
9 PRINT"FACES AS SHOWN LATER AND KEEP THE CUBE"
10 PRINT"IN THIS OVERALL POSITION THROUGHOUT. IT"
11 PRINT"IS VERY USEFUL TO IDENTIFY THE FACES BY"
12 PRINT"THE COLOURS OF THEIR CENTRE SQUARES AS"
13 PRINT"THESE NEVER CHANGE."
14 PRINT"▯THE DIRECTIONS OF ROTATION ARE GIVEN AS"
15 PRINT"IF LOOKING DOWN ON THE TOP FACE."
16 PRINT"▯N.B. UPPER AND LOWER CASE LETTERS MAY"
17 PRINT"BE INTERCHANGED ON SOME MACHINES."
18 DIME%(5,5,5),C%(1,4,4,5)
19 DEFFNA(X)=X-4*INT((X-1)/4)
20 DEFFNB(X)=X-(X<5ANDX>0)*(FNA(X+A-1)-X)
25 FORA=0TO5:FORB=0TO5:FORC=0TO5:E%(A,B,C)=C:NEXTC,B,A
30 FORA=0TO1:FORB=0TO4:FORC=0TO4:FORD=0TO5:C%(A,B,C,D)=D:NEXTD,C,B,A
40 F$="TESWNB"
50 DEFFNF(X)=ASC(MID$(F$,X+1,1))
60 T$="CKATRLTALRKC"
70 PRINT"▯▯PRESS SHIFT TO CONTINUE"
80 WAIT152,1
100 PRINT"▯▯NOTATION▮"
110 PRINT"▯TOP FACE IS LABELLED ................. ▯T▮"
120 PRINT"▯BOTTOM FACE IS LABELLED .............. ▯B▮"
130 PRINT"▯FRONT FACE (SOUTH) IS LABELLED ...... ▯S▮"
140 PRINT"▯BACK FACE (NORTH) IS LABELLED ....... ▯N▮"
150 PRINT"▯LEFT FACE (WEST) IS LABELLED ........ ▯W▮"
160 PRINT"▯RIGHT FACE (EAST) IS LABELLED ....... ▯E▮"
170 PRINTTAB(10)"▯______"
180 PRINTTAB(9)"/     /|N"
190 PRINTTAB(8)"/ T  / |"
200 PRINTTAB(5)"W /    /  |              ___________"
210 PRINTTAB(7)"┌────┐  |         ▯PRESS SHIFT"
220 PRINTTAB(7)"|    |E |         ▯TO CONTINUE"
225 PRINTTAB(7)"| S  | /"
230 PRINTTAB(7)"|    |/"
240 PRINTTAB(7)"└────┘/▯B▯"
250 WAIT152,1
255 POKE59468,14
260 PRINT"▯▯♥ ╭──╮♠¯♥  ╭♥¯¯ ╮╱ ─┌┐♠│╮┌╱ ╮╱♥│─╭─│╮┌╱♥"
261 PRINT"▯─┌┐♠│¯ 180▯▯▯ (♠╱│ ─♠─¯) ....... ♥╭──╮♠ ▯2"
265 PRINT"▯▯─┌─ ¯ ♠╱¯ ○ ─♠─¯♥"
270 PRINT"▯─┌┐♠│¯ 90▯▯▯ │┌○♠─¯♥  ┌╱ ........ ♥╭──╮♠ ▯T"
271 PRINT"▯─┌┐♠│¯ 90▯▯▯ ♠○♠ │ ──┌╲  ┌╱ ..... ♥╭──╮♠ ▯A"
280 PRINT"▯▯─┌─ ╱ ♠╱¯ ♥ ─♠─¯♥"
281 PRINT"▯─┌┐♠│¯ 90▯▯▯ │┌ │ ┌ └¯─│ ....... ♥╭──╮♠ ▯L"
282 PRINT"▯─┌┐♠│¯ 90▯▯▯ │┌ │ ┌ ─╮│ ‖ ...... ♥╭──╮♠ ▯R"
290 PRINT"▯▯─┌─ │ ♠╱¯ │ ─♠─¯♥"
291 PRINT"▯─┌┐♠│¯ 90▯▯▯ ─└┌─╱○╮♥¯ ......... ♥╭──╮♠ ▯C"
292 PRINT"▯─┌┐♠│¯ 90▯▯▯ ♠╱│╮─¯└┌─╱○╮♥¯ .... ♥╭──╮♠ ▯K"
300 PRINT"▯▯┌└¯♥♥ ♥├─│ ─┌─ ¯♠♠╲┐└¯♥"
301 WAIT152,1
310 PRINT"▯▯┌♠♠╲┐└¯♥ ┌─ ─┌│♠│╮┌╱ ╮╱♥│─╭─│╮┌╱♥"
320 PRINT"▯▯│2 ╲¯♠╱♥ │ ╭─╱ │──♠─¯ │ │─┌╱│ │ 180▯▯▯"
```



TWIDDLING WITH A PET



SOLVE THE CUBE!

```
330 PRINT"▓┌A ╲▔♠/♥ | ／_／ ▔--♠-▔ 90.▔D▓ ♠0♠ | -┘╲ ┌."
340 PRINT"▓/L ╲▔♠/♥ | ／_／ /--♠-▔ 90.▔D▓ |┌ | |▔ L▔-|"
350 PRINT"▓IK ╲▔♠/♥ | ／_／ |--♠-▔ 90.▔D▓ ♠/|.--┘┌-/o╲♥▔"
355 PRINT"▓▓▓
360 PRINT"▓▓o╲LL ┌, o♠/| | |▔ ♥┌L.|╲┌/ |┌ |▔ ┌/|┐/|"
370 PRINT"|┌ ♠ ┐-╲/|▔- ( V/)? ";
371 POKE144,50
374 GETA$:IFA$=""THEN374
375 POKE144,46:IFA$<>"Y"THENPRINT"/┌":GOTO377
376 PRINT" ┌♥":PP=1:OPEN4,4:PRINT#4
377 FORJ=1TO500:NEXT:PRINT"▔":POKE59468,12
378 A=3
379 FORL=0TO5
380 PRINT"▔▓LOOK AT THE "CHR$(FNF(L))"-FACE OF YOUR CUBE"
390 PRINT"▓"TAB(18);CHR$(FNF(-4*(L=0ORL=5)))
400 PRINT"▓"TAB(12)"┌───┬───┬───┐"
410 FORZ=1TO3
420 PRINTTAB(12)"|   |   |   |"
425 PRINTTAB(12)"|   |   |   |"
430 PRINTTAB(12)"|   |   |   |"
435 IFZ=3THEN460
440 PRINTTAB(12)"├───┼───┼───┤"
450 NEXTZ
460 PRINTTAB(12)"└───┴───┴───┘"
470 PRINT"▓"TAB(18);CHR$(FNF(5+3*(L=0ORL=5)))
480 POKE33178,FNF(FNA(L+1+2*(L=0)+(L=5)))-64
490 POKE33194,FNF(FNA(L-1-2*(L=0)+(L=5)))-64
500 PRINT"▓TYPE LETTER OF FACE WHICH HAS THE SAME"
505 PRINT"COLOUR CENTRE SQUARE AS FLASHING SQUARE"
510 PRINT"(PRESS DELETE TO ERASE ANY ERROR)."
512 PRINT"PRESS RETURN WHEN  -FACE IS COMPLETE.▓"
513 POKE33706,PEEK(32780)-128
515 PRINT"▓▓▓▓▓"TAB(11);
520 FORY=0TO3:FORV=0TO2
530 PRINT"▓▓▓";
531 IFY=3THEN535
532 IFY=1ANDV=1THENA$=CHR$(PEEK(32780)-64):GOTO600
533 POKE144,50
535 GETA$:IFA$=""THEN535
536 POKE144,46
537 IFA$<>CHR$(20)THEN575
540 IFVTHEN550
545 IFY=0THEN533
546 Y=Y-1:V=2
547 PRINT" ":PRINT"▔▔▔▔"TAB(22);" ▓";:GOTO533
550 PRINT" ▓▓▓▓▓▓ ▓";
560 V=V-1
565 IFV=1ANDY=1THEN550
570 GOTO533
575 Q=10
577 IFY<3THEN580
578 IFASC(A$)-13THEN535
579 GOTO820
580 FORI=0TO5:IFASC(A$)=FNF(I)THENQ=I
590 NEXTI:IFQ=10THEN533
600 PRINTA$;
610 IF(Y+V)<>2*INT((Y+V)/2)THEN740
620 IFY=1THEN800
625 IFL=0ORL=5THEN660
630 T=-(Y=2)
640 J=FNA(L-V+1):K=L
650 GOTO710
660 T=L/5
670 J=FNA(V-1-2*(L=5)):K=4-Y
710 C%(T,J,K,L)=Q
720 C%(T,K,J,L)=Q
730 GOTO800
```

GAMES

Get all the latest APPLE GAMES here!

sbd Software

Raster Blaster £16.95
Have your own pinball machine within the Apple II.

Apple Panic £14.95
Don't let the apples eat you as you race up & down the ladders

Pool 1.5 .... £18.95
Play pool on your Apple, improve your game.

Zork £24.95
The best adventure game yet.

Sneakers £16.95
There are Sneakers, Cyclops, Saucers, Fangs, H-Wings ... and more

Autobahn £14.95
Drive your car down the Autobahn, avoid collision if possible.

Epoch £19.95
Guide your spaceship through the galaxy. Shoot down the aliens, go through time warps, refuel on friendly bases.

Gorgon £24.95

The Warp Factor £24.95
This galaxy game is one of the trickiest on the market.

Cranston Manor £17.95
The latest in the Hi-res Adventure series.

Pegasus II £17.95

Missile Defence £17.95
Defend the cities against rocket attack. Three ground bases.

And of course we still have all your favourites: The Galactic Saga, Alien Rain, Alien Typhoon, Snoggle, Old-orf's Revenge, Draw Poker, The Wizard & the Princess ... & lots more.

All prices plus VAT, postage & packing free.
Dealer Enquiries welcome.

Contact: **SBD Software**
15 Jocelyn Road Richmond TW9 2TJ
Tel: 01-948 0461

Circle No. 125

LANDAU

ELECTRONICS LTD

THE

COMPUTER, VIDEO AND ELECTRONIC GAMES SPECIALISTS

COME TO OUR PRE-CHRISTMAS
*** ATARI® EXTRAVAGANZA***
THURSDAY 26th NOVEMBER
ALL DAY TILL 8pm

IN
LION HOUSE, 227 TOTTENHAM COURT ROAD, LONDON WC1. Tel: 637 3024

PRODUCTION OF THIS AD ENTITLES YOU TO
£10 OFF ATARI® 400/800 COMPUTERS
£5 OFF ATARI® VIDEO GAME
£1 OFF ALL SOFTWARE
on this day only

See our tremendous range of hand-held games. Also chess, learning aids and programmable calculators at very competitive prices.

BUY EARLY FOR CHIRSTMAS!

MAIL ORDER DEPT
01-643 5494

Also at:
Video City Centre, 5 Tottenham Court Road.
Sonic Sound, Charing Cross Rd.
Landau Radio, 195 High St., Sutton.

Circle No. 126

HAYDEN SOFTWARE

Available from Good Computer Stores and Technical Bookshops

SARGON II *(Spracklens)*

The first great computer chess program! "We are impressed with the program's speed, its opening book, and its much improved end game ... Save your money and buy SARGON II ..." *'80 Software Critique.*
Seven levels of play, and levels 0-3 play in tournament time. It has a randomized opening book for all seven levels of play through three moves. When setting up the board, the user can scan up and down, left and right. A special hint mode included at all levels of play but 0 will suggest a good, but not necessarily the best, next move you can make.

400034042	APPLE II	£23.30
400034093	APPLE II Disk	£27.20
400034034	TRS 80 Level I	£23.30
400034085	TRS 80 Level II Disk	£23.50
400034107	OSI	£23.30
40003414X	OSI Disk	£27.20

REVERSAL *(Spracklens)*

Winner of the software division of the First International Man Machine OTHELLO™ Tournament, this version of the 200 year old game Reversi features 27 levels of play and high-resolution colour graphics.

400070049	APPLE II Tape	£23.30
40007009X	APPLE II Disk	£27.20

STARCLASH *(Walton)*

The mission in STARCLASH is to achieve victory by destroying the opposing empire, it is easy to learn, yet constantly challenging and fun.
STARCLASH is unlike most other space games, in that it does not involve firing ray guns at passing ships, dropping atom bombs, etc. It is truly a strategic battle game played in outer space. Speed is not a factor here. A player may take as much time as he or she wishes to make a move, much like computer chess. In addition, the computer plays several different strategies, so that you never play the same game twice.

400059037	TRS 80 Level II	£13.20

MIND THRUST *(Sackson and Wazaney)*

The first of its kind — an exciting game that lets you match wits with the computer! The object is to complete an unbroken chain across the board before your opponent, the computer. There's a special feature; you may switch sides whenever you wish and gain control over your opponent's pieces, but this means that the computer has control over your chain, as well. Every game is different.

400074036	TRS 80 II Tape	£12.50

Software prices exclusive of VAT
APPLE is a trade mark of Apple Computer Co. Inc. and is not affiliated with Hayden Book Co. Inc.

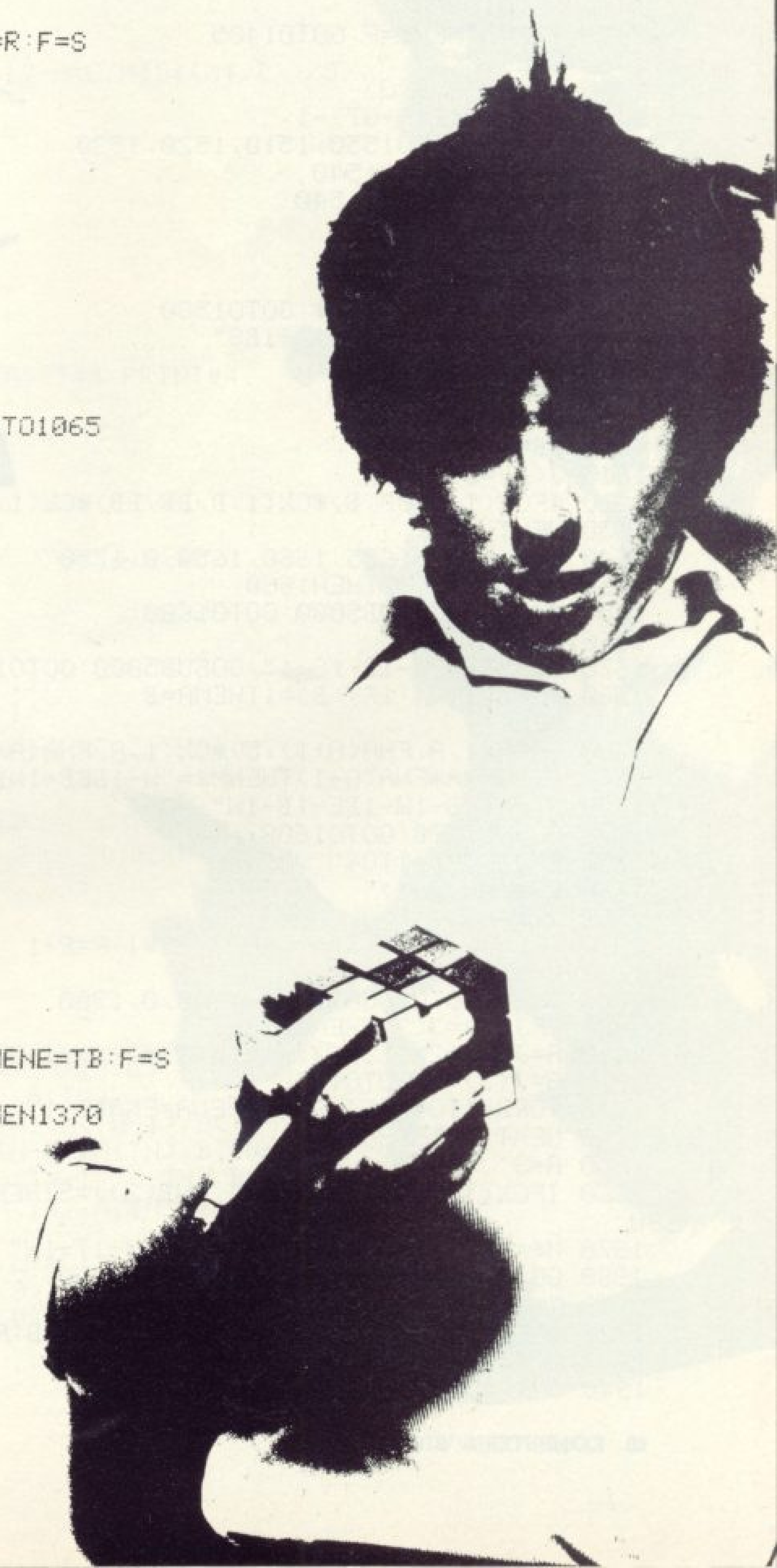
New detailed Software Catalogue Now Available

Distributed by
John Wiley & Sons Limited
Baffins Lane · Chichester · Sussex · England

Circle No. 127

SOLVE THE CUBE!

```
740 IFY-1THENK=32866+Y*320
750 IFY=1THENK=33178+V*8
760 FORX=0TO5:IFPEEK(K)+64=FNF(X)THENE%(X,L,L)=Q:E%(L,X,L)=Q
770 NEXTX
800 NEXTV
810 PRINT:PRINT"▒▒▒"TAB(11);:NEXTY
820 NEXTL
825 POKE59468,14
830 PRINT"▒▒┤┌┘└┘┌o | |┌♥┐ ╮/♥|_ ╭─|╮┌/♥:─▒"
840 PRINT"▒|┐ ─♠─┐─ ╯└ ╭┌| |┌ ♠└|┐─ | |┐ ┳♥╮|╮┌/♥   ┌─ | |┐ ─♠─┐♥ ─ ╭┐┐| |┌/ |┌┐
┐|─."
850 PRINT
1000 A=0:FORB=1TO4
1010 FORR=0TO5:FORS=0TO5
1020 IFE%(R,S,R)=0THENIFE%(R,S,S)=BTHENE=R:F=S
1030 NEXT:NEXT
1037 IFE=FNA(E)ANDF=FNA(F)THEN1065
1038 IFE+F<5THEN1048
1039 BR=FNA(E+F-B)-1
1040 ONBR+1GOTO1048,1041,1042,1043
1041 M$="B":GOTO1045
1042 M$="B2":GOTO1045
1043 M$="B-1"
1045 GOSUB5000
1046 IFF=5THENE=B:GOTO1048
1047 F=B
1048 IFE=0ANDF=BTHEN1140
1049 A=E+F+5*(E+F>5):M$="E":GOSUB5000
1050 IFE=FNA(E)THENF=FNA(E+INT(F/2)-1):GOTO1065
1060 E=FNA(F+INT(E/2)-1)
1065 QQ=0
1070 TR=FNA(F-B+1)-1
1075 ONTR+1GOTO1096,1080,1085,1090
1080 M$="T":GOTO1095
1085 M$="T2":GOTO1095
1090 M$="T-1"
1095 GOSUB5000
1096 IFQQ=1THEN1140
1097 A=F
1100 IFFNA(E-F)=1THENM$="E":GOTO1120
1110 M$="E-1"
1120 GOSUB5000
1130 QQ=1:TR=4-TR+4*(TR=0):GOTO1075
1140 NEXTB
1150 FORB=1TO4
1160 FORTB=0TO1:FORS=1TO4
1170 R=FNA(S-1)
1180 F1=C%(TB,S,R,5*TB)
1190 F2=C%(TB,S,R,S)
1200 F3=C%(TB,S,R,R)
1210 IFF1*F2*F3THEN1230
1220 IFF1*F1+F2*F2+F3*F3=B*B+FNA(B-1)↑2THENE=TB:F=S
1230 NEXTS,TB
1232 IFE=0ANDF=BANDC%(0,F,FNA(F-1),0)=0THEN1370
1240 IFETHEN1280
1250 A=F
1260 M$="EBE-1":GOSUB5000
1270 F=FNA(F-1)
1280 BR=FNA(F-B+1)-1
1290 ONBR+1GOTO1340,1300,1310,1320
1300 M$="B":GOTO1330
1310 M$="B2":GOTO1330
1320 M$="B-1"
1330 GOSUB5000
```



```
1340 A=B:IFC%(1,B,FNA(B-1),FNA(B-1))=0THENM$="N-1B-1N":GOSUB5000:GOTO1370
1350 IFC%(1,B,FNA(B-1),5)=0THENM$="EB2E-1B-1":GOSUB5000
1360 M$="EBE-1":GOSUB5000
1370 NEXTB
1375 D$="B-1E-1BEBSB-1S-1"
1380 FORB=1TO4
1390 FORR=1TO5:FORS=1TO5
1400 IFE%(R,S,R)=BTHENIFE%(R,S,S)=FNA(B-1)THENE=R:F=S
1410 NEXT:NEXT
1420 IFE=BANDF=FNA(B-1)THEN1590
1430 IFE=5ORF=5THEN1470
1435 IFF=FNA(E+1)THENA=E:GOTO1450
1440 A=F
1450 M$=D$:GOSUB5000
1460 GOTO1390
1470 IFE=5THENQ=F:GOTO1485
1480 Q=E
1485 GT=E%(E,F,Q)
1490 BR=FNA(E+F-GT)-1
1500 ONBR+1GOTO1550,1510,1520,1530
1510 M$="B":GOTO1540
1520 M$="B2":GOTO1540
1530 M$="B-1"
1540 GOSUB5000
1550 A=FNA(GT-1)
1560 IFGT=BTHENM$=D$:GOTO1580
1570 M$="BWB-1W-1B-1S-1BS"
1580 GOSUB5000
1590 NEXTB
1600 R=0:FORB=1TO4
1610 BB=FNA(B-1)
1615 J(B)=0
1620 IFC%(1,B,BB,B)*C%(1,B,BB,BB)*C%(1,B,BB,5)=5*B*BBTHENJ(B)=1:R=R+1
1630 NEXT
1640 ONR+1GOTO1655,1680,1650,0,1750
1650 IFJ(1)=J(3)THEN1660
1655 M$="B":GOSUB5000:GOTO1600
1660 A=2-J(2)
1670 M$="BSWBW-1B-1S-1":GOSUB5000:GOTO1600
1680 FORB=1TO4:IFJ(B)=1THENA=B
1690 NEXT
1700 S=C%(1,A,FNA(A+1),5)*C%(1,A,FNA(A+1),A)*C%(1,A,FNA(A+1),FNA(A+1))
1710 IFS=5*A*FNA(A-1)THENM$="W-1BEB-1WBE-1B-1":GOTO1730
1720 M$="BEB-1W-1BE-1B-1W"
1730 GOSUB5000:GOTO1600
1750 R=0:FORB=1TO4
1755 BB=FNA(B-1)
1760 J(B)=0
1770 IFC%(1,B,BB,5)=5THENJ(B)=1:R=R+1
1780 NEXT
1790 ONR+1GOTO1850,1830,1800,0,1900
1800 IFJ(1)=J(3)THEN1820
1810 A=J(4)*2+J(3)-J(4)*(J(3)*2-1)+1:GOTO1860
1820 A=J(3)+1:GOTO1860
1830 FORB=1TO4:IFJ(B)=1THENA=FNA(B-1)
1840 NEXT:GOTO1860
1850 A=3
1860 IFC%(1,FNB(3),FNB(2),FNB(2))=5THENM$="W-1TWSTS-1BST-1S-1W-1T-1WB-1":GOTO18
80
1870 M$="BW-1TWSTS-1B-1ST-1S-1W-1T-1W"
1880 GOSUB5000:GOTO1750
1900 R=0:A=3:FORB=1TO4
1920 IFE%(5,B,5)*E%(5,B,B)=5*BTHENA=B:R=R+1
1930 NEXT
1940 ONR+1GOTO1970,1960,0,0,2000
```



SOLVE THE CUBE!

```
 1960 IFE%(5,FNB(2),FNB(2))*E%(5,FNB(2),5)=5*FNB(4)THENM$="W2BSN-1W2NS-1BW2":GOT
01980
 1970 M$="W2B-1SN-1W2NS-1B-1W2"
 1980 GOSUB5000:GOTO1900
 2000 R=0:A=2:FORB=1TO4
 2010 J(B)=0
 2020 IFE%(5,B,5)=5THENJ(B)=1:R=R+1
 2030 NEXT
 2040 ONR+1GOTO2080,0,2050,0,3000
 2050 IFJ(1)=J(3)THEN2070
 2060 A=J(3)*2+J(2)-J(3)*(J(2)*2-1)+1:M$="SBT-1E2B2T2WBW-1T2B2E2TB-1S-1B-1":GOTO
2090
 2070 A=2-J(1)
 2080 M$="SBT-1E2B2T2WB2W-1T2B2E2TB-1S-1B2"
 2090 GOSUB5000:GOTO2000
 3000 IFEE=12OREE=25THENPRINT:IFPP=1THENPRINT#4
 3005 PRINT"▚←╲╱╲●":IFPP=1THENPRINT#4,"▜▚FINIS":CLOSE4
 4900 END
 5000 IFM$=""THENRETURN
 5010 R$=LEFT$(M$,1)
 5015 IFR$=M$THEN5030
 5020 IFASC(MID$(M$,2))<64THENR$=LEFT$(M$,12-ASC(MID$(M$,2))/5)
 5030 M$=MID$(M$,LEN(R$)+1)
 5040 FORU=0TO5:IFASC(R$)=FNF(U)THENL=FNB(U)
 5050 NEXTU
 5054 IFPP=1THENPRINT#4,"▜"CHR$(FNF(L));
 5055 PRINTCHR$(FNF(L)+128);
 5056 EE=EE+1
 5057 IFLEN(R$)=2THENSF$="2 ":GOTO5059
 5058 SF$=MID$(T$,L*2+1+LEN(R$)/2,1)+" "
 5059 PRINTSF$;:IFPP=1THENPRINT#4,"▩"SF$;
 5061 IFEE=13THENPRINT:IFPP=1THENPRINT#4
 5062 IFEE=26THENPRINT"▩":EE=0:IFPP=1THENPRINT#4:PRINT#4
 5065 FORLP=1TOLEN(R$)
 5070 A(0)=-4*(L=0ORL=5):A(4)=A(0)
 5080 A(1)=FNA(L-1-2*(L=0)+(L=5))
 5090 A(2)=5+3*(L=0ORL=5)
 5100 A(3)=FNA(L+1+2*(L=0)+(L=5))
 5105 FORLK=0TO4:B(LK)=A(LK):NEXT
 5112 E1=E%(L,A(3),L)
 5114 E2=E%(L,A(3),A(3))
 5120 FORTN=3TO1STEP-1
 5130 E%(L,A(TN),L)=E%(L,A(TN-1),L)
 5140 E%(L,A(TN),A(TN))=E%(L,A(TN-1),A(TN-1))
 5150 E%(A(TN),L,A(TN))=E%(A(TN-1),L,A(TN-1))
 5160 E%(A(TN),L,L)=E%(A(TN-1),L,L)
 5170 NEXTTN
 5175 E%(L,A(0),L)=E1:E%(A(0),L,L)=E1
 5180 E%(L,A(0),A(0))=E2:E%(A(0),L,A(0))=E2
 5190 IFL>0ANDL<5THENA(0)=L:A(4)=L:A(2)=L
 5200 T=-(L=5)
 5210 C1=C%(T,A(3),A(0),L)
 5215 C2=C%(T,A(3),A(0),B(3))
 5220 C3=C%(T,A(3),A(0),B(0))
 5230 FORTN=3TO1STEP-1
 5240 T1=-((TN<3ANDL>0)ORL=5)
 5250 T2=-((TN>1ANDL>0)ORL=5)
 5260 C%(T1,A(TN+1),A(TN),L)=C%(T2,A(TN),A(TN-1),L)
 5270 C%(T1,A(TN),A(TN+1),L)=C%(T2,A(TN-1),A(TN),L)
 5280 C%(T1,A(TN+1),A(TN),B(TN))=C%(T2,A(TN),A(TN-1),B(TN-1))
 5290 C%(T1,A(TN),A(TN+1),B(TN))=C%(T2,A(TN-1),A(TN),B(TN-1))
 5300 C%(T1,A(TN),A(TN+1),B(TN+1))=C%(T2,A(TN-1),A(TN),B(TN))
 5310 C%(T1,A(TN+1),A(TN),B(TN+1))-C%(T2,A(TN),A(TN-1),B(TN))
 5320 NEXTTN
 5330 C%(T,A(0),A(1),L)=C1:C%(T,A(1),A(0),L)=C1
 5340 C%(T,A(0),A(1),B(0))=C2:C%(T,A(1),A(0),B(0))=C2
 5350 C%(T,A(0),A(1),B(1))=C3:C%(T,A(1),A(0),B(1))=C3
 5360 NEXTLP
 5370 GOTO5000
```



Kit Korner

TROUBLE SHOOTING ZX81

THIS year Sinclair has flooded the home computer market with the ZX81, giving almost everyone the chance to break into this fascinating field. Despite the low cost of a ready-built ZX81, the saving offered on the kit has tempted many with no constructional experience whatsoever, to chance their luck.

Unfortunately a simple fault or problem can be very off-putting for the beginner, so I am going to give you a few points to look out for before and after construction. Many of these have come up on the ZX81 but most apply to all kits.

To begin with, the ZX81 has been designed to fit into as small a case as possible. Consequently the board layout is a little more muddled than some I have come across and requires careful checking.

If you bought a kit before June of this year the first thing to look out for is an incorrect component listing. An errata was supposed to have been included but many kits went out without one. The circuit diagram if you can follow it shows that R3 and R6 must be swapped over, i.e. R3 — not used and R6 — 2K2. Also R15 should read 220K but this is not crucial and works well with the 1K0 resistor suggested on the components list.

If there is a circuit diagram as well as a component list with any kit, check one against the other and if there is a discrepancy find out which is correct before proceeding. It will save you time and trouble in the long run.

As I mentioned before, always take care when soldering in components, especially transistors, to prevent overheating. Two transistors are supplied with the ZX81, TR1 and TR2. Both are ZTX313's, which are very small physically, and proved a real problem to even the skilled kit builders. The effects of overheated transistors are distorted characters or no picture at all. For those who think they may have damaged their's the direct equivalent to the ZTX313 is the 2N2369.

Take care this time to mount the transistors at least a quarter-of-an-inch above the board and solder lightly. Also make sure that you have put the transistor in the right way round as the pin layout may be different.

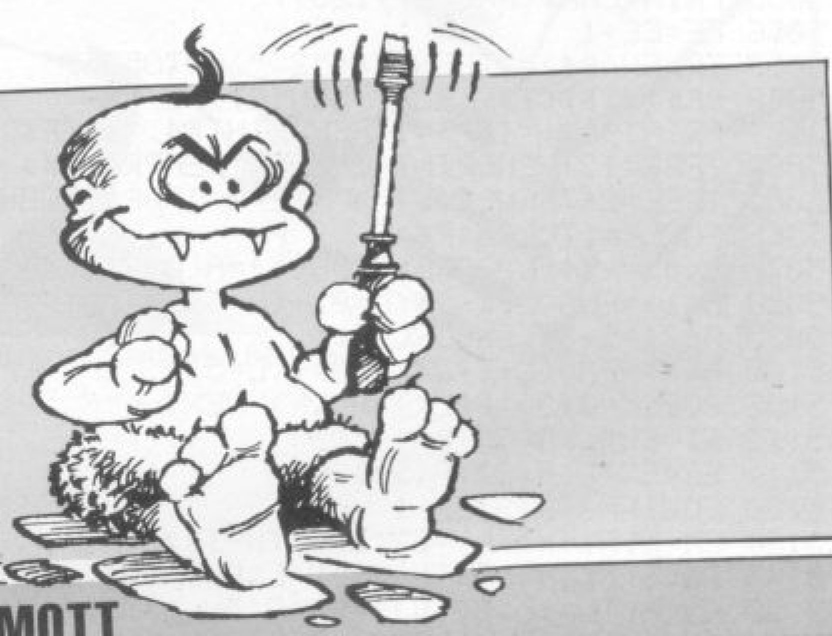
Another problem I found, even with ready-built versions, was the keyboard connector. Initially the connectors are very stiff but after a few insertions it becomes easier, although you must still take care not to crease the keyboard tails. If the ZX81 will not accept inputs from the keyboard check this point first, even if yours is ready-built. It may have been shaken loose in transport.

One trick I had to learn was to cut the tails, having fractured one of the tracks through creasing, and carefully scrape away the insulation on the right side to make contact again. This is a last resort as a creased tail is not a serious problem unless you intend to take the ZX81 apart often. However, send the ZX81 back for a replacement if the fault is in the keyboard itself.

When specifying the kit version you are given the option of buying the power supply which is recommended. If, however, you decide to use your own, be warned that if it gives more than 12 volts, which is permitted by the regulator but not by Sinclair, the regulator will overheat and may even cut out after a time. This will not harm the circuit for as soon as the regulator has cooled down it will return to operation, but it is annoying if you have just entered in a long program.

To cure this I cut out a larger heat sink from a piece of 12 gauge aluminium sheeting, which sits all the way across the front of the board, as I sometimes use a power supply of 14.5 volts, i.e. a spare car battery. Of course you must never run a computer off a battery in a running car!

There is one precaution you should take to prevent "blowing up" chips. This can occur when a static charge accumulates on one or more of the pins of the chip. To prevent this, touch something earthed, like a water tap or some large item of electrical equipment, such as a washing machine or cooker, before going to work. Also touch the chips as little as possible. Dirty pins are as difficult as open circuits to trace.



BY KEITH MOTT

Fortunately the ZX81 comes with a circuit and layout diagram as well as a corrected component list. The board, even in its muddled design, has a helpful layout printed on it, as so many do these days, with the component number nearby. Build it correctly and carefully as instructed, as you will be very lucky to find the faults afterwards!



ingenious!

...that's the only word to really describe the superb Genie microcomputer system, the home computer which is compatible with the TRS 80, and ideal for all micro – enthusiasts, especially the committed hobbyist.

Genie has now been upgraded to Genie I, incorporating all of the original, excellent features, but with the addition of:

- Extended BASIC, including RENUMBER and SCREEN PRINT.
- Full upper and lower case, flashing cursor and auto-repeat on all keys.
- An internal SOUND UNIT to add a new dimension to your own programs.
- A MACHINE LANGUAGE MONITOR, with Display, modify, enter and execute (with break points) facilities.

Genie I has all of this, plus the built-in cassette deck, 16K RAM, 12k ROM with BASIC interpreter, full-size keyboard, an extremely wide range of new and up-dated peripherals, and literally 1000's of pre-recorded programmes available.
Yet, almost unbelievably, the price of Genie I is even lower than that of the original Genie.

Ingenious for business



The Genie II is a major breakthrough for small business computers. Harnessing all the advantages of Genie I, including low price, Genie II adapts perfectly to commercial functions with the following features:

- Numeric keyboard
- Four usable, definable function keys.
- Extension to BASIC
- Basic business commands
- Fully expandable with the same peripherals

New!...12″ Monitor

Now, a choice of 2 monitors giving a clear easy to read image. The updated EG101 has a new green phospher tube.





New!...Expander

An updated Expansion Box (EG 3014) is a major feature of the new Genie I system, and unleashes all its possibilities, allowing for up to 4 disk drives with optional double density. It connects to a printer, or RS232 interface or S100 cards. There is 16k RAM fitted and it has a new low price!

New!...Printer

The EG 602 printer can be connected to the Genie either through the expander or directly into the computer using the Parallel Printer Interface. It is a compact unit, with an 80 column, 5 x 7 matrix print-out, operating quietly and efficiently at 30 characters per second.





Disk Drive

As well as the obvious advantage of mass storage, the addition of the disk system to the Genie means much faster access to other languages and full random access file handling. Up to 4 of these 40 track drives can be used on a system.

SPECIAL TECHNICAL GENIE HOT – LINE ON 0629 4995

for all your technical advice and service back-up on any aspect of the Genie system direct from the experts!

For full details and demonstration of Genie I, Genie II or advice on any aspect of the system, either call in to your local dealer, or write directly to the sole importers at the address below.

LOWE electronics

Chesterfield Road, Matlock, Derbyshire DE4 5LE.
Telephone: 0629 4995. Telex: 377482 Lowlec G.

Circle No. 130

COUNTDOWN TO PANIC

If you panic in stress situations, the bomb defusing game, Le Boom, will either kill or cure you.

Discover whether you are clear-headed and steely-nerved enough to compete with the army's bomb disposal unit. It is your job to defuse a rocket shaped bomb from electronic clues before the thing goes off.

A choice of four different skill levels, generate the game's electronic sounds, which form the clues to preventing the big bang. You must also choose the length of fuse wire — the longer the wire, the more time you have to find the correct sequence to stop the bomb from exploding.

Le Boom is built to last and it's durable plastic moulding will withstand most violent bangs. If you fail to defuse the thing don't worry, it won't blow you to kingdom-come — but you do get a series of explosion noises imitating the real thing.

Your sense of panic is prompted by the electronic din getting louder as the bang comes closer. The toy is a welcome addition to the range of electronic toys brought out by Oxfordshire based toy manufacturers Action Games and Toys.

In addition it falls into the low end of the electronic games market with the cheap price tag of £14.49 and runs on four MN1300 batteries (not supplied). A good Christmas bargain from most large stores with toy departments.

MUSICAL MEMORY TWINS

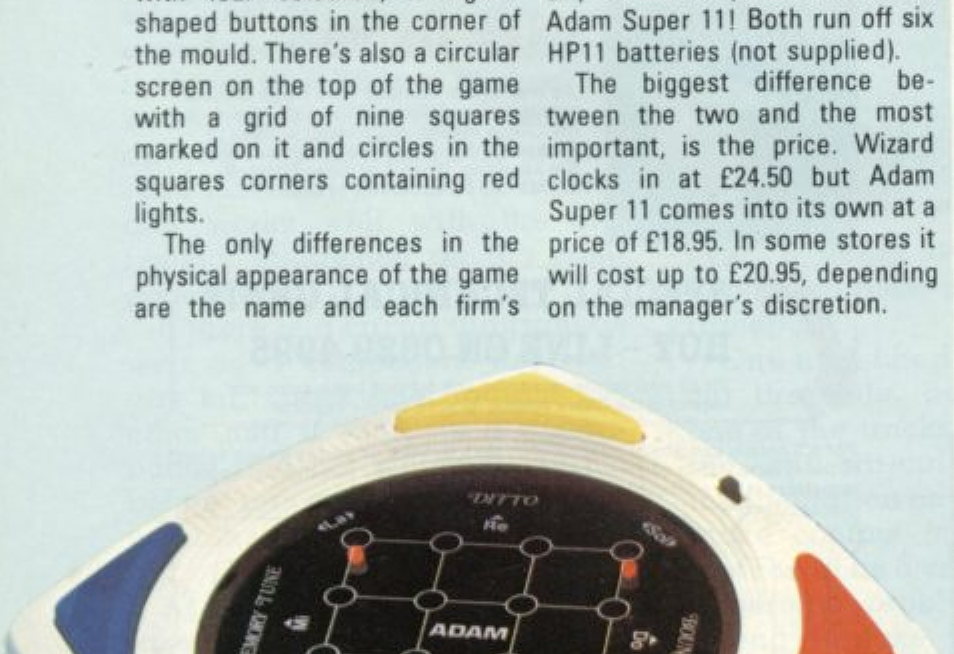
The design teams of Waddingtons and Adam Imports must have got together to produce their respective versions of the musical memory money-spinner, Simon.

Each is made of the same white and blue plastic casing with four coloured, triangular shaped buttons in the corner of the mould. There's also a circular screen on the top of the game with a grid of nine squares marked on it and circles in the squares corners containing red lights.

The only differences in the physical appearance of the game are the name and each firm's own logo. The Adam Import version is called Adam Super 11 (pictured) from the company's Grandstand range of electronic toys while the Waddingtons' one goes by the name Wizard.

Both games are for one to four players, with a minimum age of six, on Wizard, and seven on Adam Super 11! Both run off six HP11 batteries (not supplied).

The biggest difference between the two and the most important, is the price. Wizard clocks in at £24.50 but Adam Super 11 comes into its own at a price of £18.95. In some stores it will cost up to £20.95, depending on the manager's discretion.





DESTRUCTION FROM THE DEEP

People who prefer shooting down enemy craft under the sea, rather the deepest voids of space, will like a 3-D hand-held game, Torpedo Shoot.

Its neatly shaped body is based on an arcade games machine with a screen at the top. The aim is to destroy the fleet of battleships which sail across the path of a torpedo under your control. Using the two arrow buttons you can manoeuvre the submarine into one of four positions from which to fire at the ships.

This is no ordinary hand-held game though, the screen with its L.C.D. display of red lights is also three dimensional adding depth and reality to the entire game.

Everytime you wipe out a battleship another one comes breezing onto the screen until your time is up. When you manage a direct hit the little machine provides you with accompanying explosion sounds to add to the realism and the target sinks.

Torpedo Shoot is aimed at the over eights and runs off one nine volt battery (not included in the package). It costs £9.83 from Leicestershire-based distributors AA Hales.

GRAND PRIX ON A "SPACESHIP"

If racing cars are more up your street than space vehicles then try one of the electronic versions around.

In this replica of the arcade game you have got two options to go for. Either the player can try a circuit race completing a certain number of laps, or he can race against the clock.

The car is controlled by two small joysticks which alters the car's speed by accelerating and braking, as well as steering the car.

Other cars on the race track are controlled by the microprocessor. The track itself is displayed on an L.C.D. screen divided into three lanes. But the actual body of the game looks more like a space ship than anything remotely to do with formula one racing.

When you opt for the circuit race the computerised game works out the time taken to complete a fixed distance of 800 kilometres. When you're racing against the clock the idea is to cover as many kilometres as possible in 140 seconds.

Points are scored for timings, the number of crashes with other cars, and the whole game comes complete with sound effects of car engines and thunderous crash noises.

A record of your achievements and lap times, number of crashes are kept by the microprocessor at the heart of the game.

It costs £27.95 and is available from Computer Games.



A BIG MATCH AT YOUR FINGERTIPS

Two electronic football games came onto the scene this season, updating the popular pub game of mechanically operated table football.

The first, called Match of the Day, has been given the seal of approval by England football captain Kevin Keegan. The oblong shaped game has a pitch marked out on an L.C.D. screen with the correct lines, goal areas, nets and corners. For one or two players, the game can be played at two levels, aptly named amateur or professional.

Beat the opposition team by controlling your players with four directional buttons and when you judge the right moment press the "shoot" button to whack the ball into the net.

Sound effects include the referee's whistle blowing whenever there's a foul, a penalty or a goal scored. The only sounds the game doesn't recreate are the shouting and singing of the football hordes. Time is kept for each half — just like the real game. Match of the Day retails for £19.95.

Another offshoot of Adam Imports' Match of the Day is the slightly more sophisticated game Grandstand Soccer. Not as attractive to look at but made of similar long-lasting plastic to Match of the Day, the game is along the same lines. For one or two players, two levels and two coloured teams, red and green, as well as diving goalies. The illuminated figures look more realistic than the Match of the Day coonterparts and have a flourescent display.

Another feature is that the ball is separate from the players. In Match of the Day, the player in possession of the ball is more brightly lit than the others.

Both games are battery powered (not included with the game) or can be run off the mains. Grandstand is priced at £27.95.

JET FIGHTER

All your tactical abilities are needed in the "search and destroy" game with a jetfighter pilot theme.

Intercept is played on an electronic board with pieces to move into position and buttons for firing on the enemy.

You are provided with an interceptor plane and S.A.M. (Sea to Air Missiles) sites and tracking indicators which are placed on the plastic grid surface.

Players can either choose to be the attacker or defence commander. Find out where your enemy is concealed by using the clues of coloured lights indicating enemy rockets and missiles launched to destroy your own forces.

Track down an enemy craft using the fire button to wipe it out and hear the rewarding sound of a direct hit and a riot of flashing lights.

From the Action Games and Toys stable this game is reminiscent of Battleships and retails at £14.49 from the firm's distributors.

Also in the Action Games and Toys catalogue is the memory and dexterity game of Computer Perfection.

The players have to match up the symbols shown on the dome shaped display, by remembering the sequence of the symbols first played by the computer's brain. This latest version of the game is an advancement on the non-electronic baby brother Perfection where you race against the clock to fit the correct shaped pieces into their home slots. Not only is it fun to play and a test of your memory but you also get a good light and sound show.

It runs off two 9 volt batteries (not supplied) and costs £17.39.



MAKING TRAKS

A good toy for children who have heard about microprocessors, is Big Trak, a programmable model lorry.

It came into the UK shops last year amid a splash of publicity because of its programmable capacity. You can enter in up to 16 different commands simply by pressing calculator type keys. The truck will go forwards, backwards, turn at any angle and complete a whole circle.

Another special feature is that it can fire single or rapid shots from its laser cannon. It looks a bit like a moon buggy with big tank tracks on the wheels and is made of heavy duty plastic so it will withstand any unsuspected crashes into furniture if the programmer miscalculates his instructions.

Big Trak can be made to negotiate courses that you set by estimating distances for the toy to cover by multiplying the lengths of Big Trak — it measures 14". It's a test of skill and accuracy on the programmer's part to get Big Trak safely round a course.

A transporter is also available at extra cost to tack onto the end of Big Trak. Not only is Big Trak fun to play with it is also believed to be educationally good for children in learning how to program and amend the program after seeing the result, without the child realising what he is doing.

Made by Milton Bradley, Big Trak costs between £27 and £35 but make sure your furniture is as robust as the toy before you buy one.



WESTERN LORE IN YOUR HANDS

Find yourself being drawn back to the lawless days of the wild west this Christmas with Gunfighter.

The game relives the legend of the shoot-out between Jesse James and Cole Younger, on a liquid crystal display screen, in the hand-held format.

Two figures fight it out in the apt setting of sandy western scrubland.

Obstacles appear on the screen to add to the difficulty — like tumbleweed wafting between the two gunmen. If any of these are hit points are deducted from the score.

The toy is made of robust plastic so it should survive if it is hurled to the floor through frustration at not winning.

The game is one of the more expensive hand-held type at £27.95 and is distributed over here by Computer Games. It runs on two HP11 batteries (not supplied).

Sounds

BY DAVID ANNAL

DOES your computer squeak when you want it to roar? Several of the "second generation" microcomputers have sound circuits built in but their output power is small and the loudspeaker often minute, one example being the Apple.

Such a loudspeaker is not capable of anything but a small squeak and will certainly not do justice to a music program or speech output.

Other computers, such as the Pet, are not equipped with any on-board amplifier or speaker at all-although the circuit to generate sounds is there and pin-outs are provided (80 column Pets do have a small "bleep").

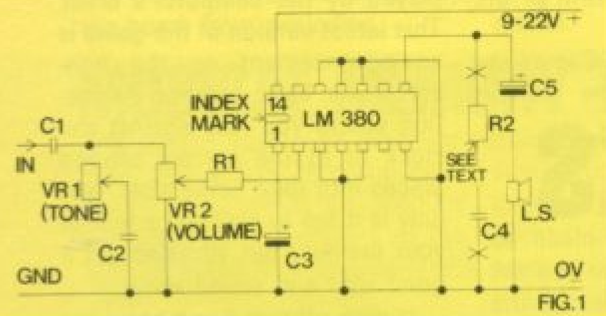


FIG.1

In the case of these quieter type of computers, a sound box is necessary and it can be used to advantage in the second generation type to increase volume and fidelity. It is always possible to connect the computer to your hi-fi auxiliary inputs and thereby obtain amplified sound.

However, it is inconvenient to trapse around to the club or your friend's house with the music-centre in tow! For these reasons I am giving details of a small, cheap, but quite powerful, general purpose amplifier which is easy to construct and which should prove very useful in many ways.

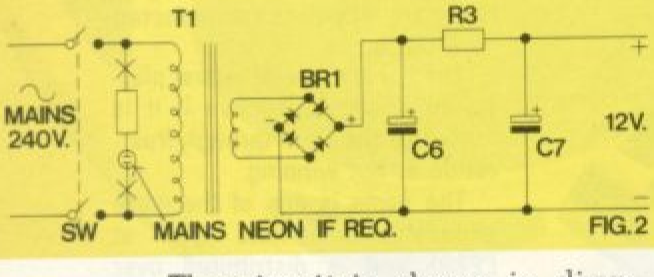


FIG.2

The circuit is shown in diagram 1. It centres around a small 14 pin integrated circuit chip, the LM380. For those of you not familiar with the DIL package, we show the chip as it actually looks when viewed from above.

This chip houses all the amplifier circuit except for the few additional components shown. C1 is an isolating capacitor. C2 and VR1 form a top-cut tone control and may be omitted if desired. VR2 is the volume control. R2 and C4 supress any tendency for the circuit to oscillate at high, inaudible frequencies and thus lose power. They are not essential and the circuit should work without them. If the amplifier is supplied by a power pack running anything else, then decouple it with a 100 μF electrolytic capacitor from pin 14 to ground.

The circuit will work on voltages from 9V to 22V and, depending on this, will give 2-5 watts output. The speaker should be of reasonable size e.g. an eliptical of 6×3". It can be 4-8 ohms impedance (even a large PA type can be tried — you'll be surprised!).

For portability and ease of operation, power can be provided by a battery of PP9 type. Alternatively, a small separate mains power pack could be constructed. This needs to be rated 100mA and a circuit for one is shown in figure 2. If the sound box is to be permanently housed inside the computer case, there may be some power available to run it from the computer power pack — see your manual but take care!

Construction is straightforward. Use 0.1" Veroboard or, if soldering is not a strong point, make it up first on a small breadboard. Make sure the electrolytic caps are the right way round. Use a 14 pin socket for the integrated circuit. The latter is quite sturdy and will stand short circuits. It also incorporates a temperature overload and will cut out if it sets too hot. For this reason, if more power is needed a heatsink can be clipped to the integrated circuit.

If a box is purchased big enough for the loadspeaker, all the rest, including the power supply, should fit inside. If using a battery, it is a good idea to incorporate a L.E.D. indicator to show when the amp is on. The current used when nothing is being output is quite low but does slowly run the battery down.

The indicator should be a flashing type e.g. using a LM3909 so as not to use up all the battery power itself by staying on all the time!

Connecting to the computer should not be difficult. In the case of a 40 column Pet for example simply join the input wire to pin M of user port and the ground to pin N. The circuit will also give increased output from your audio cassette player and can be used to monitor the cassette functions on the computer — consult your manual.

All the components are standard and should be easily obtainable from component shops or by post. The total cost of the whole sound box including speaker and mains power pack should be no more than £8, excluding case.

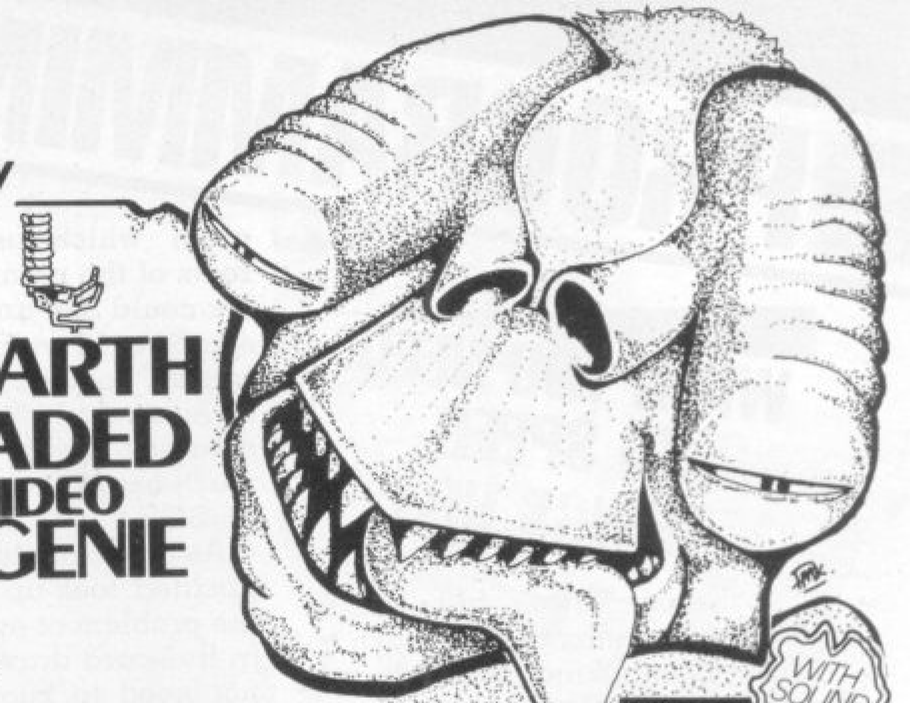
Component list

C1 0.15μF 100V Polyester.
C2 0.047μf any type.
C3 1μF min. electrolytic.
C4 0.1μf any type.
C5 470μF 25V electrolytic.
C6 1000μF 25V electrolytic.
C7 2000μF 25V electrolytic.
VR1 10K Lin. potentiometer.
VR2 250K log. potentiometer.

Also required — small piece. 1" veroboard, 14 pin DIL holder & suitable case.

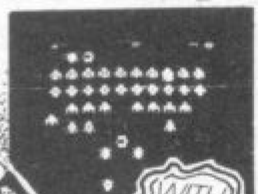
R1 680K $\frac{1}{8}$ watt.
R2 2.7ohms $\frac{1}{8}$ watt.
R3 47ohms 1 watt.
BR1 50V 1A min. bridge rectifier.
T1 12V 100mA mains transformer.
IC1 LM380.
SW 2-pole mains on/off.
LS 8ohm loudspeaker.
Mains neon if required.

The Essential Software Company



THIS IS NOT A PRACTICE DRILL! EARTH IS BEING INVADED ON YOUR TRS 80 & VIDEO GENIE

Galaxy Invasion

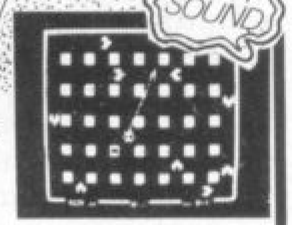


The newest and most exciting invaders type game yet! Cruel and crafty aliens attack Earth. You are the sole defender. As you fire your laser at the aliens they swoop down and bomb you. Exciting use of graphics! Must be seen.

WITH SOUND

TRS 80 Level I & II 16K Tape
Video Genie 16K Tape

Attack Force



WITH SOUND

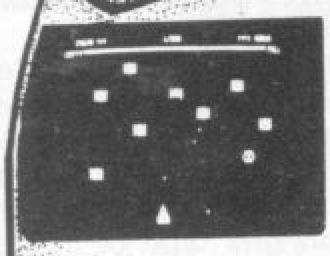
Dodge the alien Ramships and fire missiles to destroy them before they get you. The alien Flagship uses his deadly laser bolt to transform a Ramship into another Flagship or into your ship's double. Look out! Destroy your double and you could destroy yourself.

TRS 80 Level I & II 16K Tape
Video Genie EG3003 16K Tape

SuperNOVA



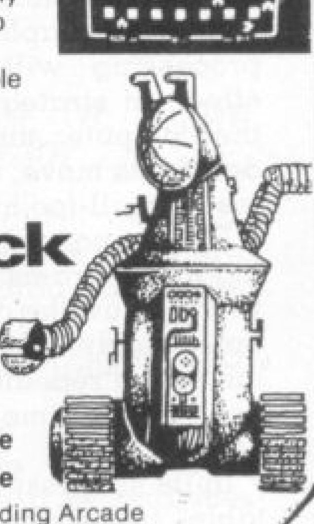
ORDER NOW



Now the amazing ASTEROIDS arcade game for your TRS 80! Your ship is floating in the middle of an asteroid belt! Your only escape is to destroy them and the crafty alien spacecraft! Blast them with your laser, thrust, rotate or hit hyperspace to survive!

TRS 80 Levels I & II 16K Tape
Video Genie 16K Tape

Robot Attack



THE GAME THAT TALKS

TRS 80 Levels I & II 16 K Tape
Video Genie 16 K Tape

The Newest and Most Astounding Arcade Game that TALKS has just Reached Planet Earth. You can't help yourself. You have to stop them at all cost. Don't let up. Written especially for high quality graphics you'll simply be dazed and excited by the action.

Cosmic Fighter

Your fighter appears below a convoy of Aliens! If you destroy them another set appears who seem to be slightly cleverer than before! Soon your space station nears but before you can dock the station comes under attack! Survival is up to you! The excitement is just beginning!!

TRS 80 Levels I & II 16K Tape
Video Genie 16K Tape

Gobble MAN



Watch out behind you! As you hurry through the maze collecting your energy modules you score points. But don't let the Gobblemen catch you. If you are crafty, sneek up behind them and neutralise them to gain extra points. Just keep a watch. When they attack you they come in fast. Just don't lose your nerve.

TRS 80 Levels I & II 16 K Tape
Video Genie 16 K Tape

3D Adventures

for TRS 80 LEVEL II 16K

3-D means that as you wander through the mazes and buildings, full screen graphic display constantly shows your position in a perspective format as though you were actually there! This "rat's eye" view adds an entirely new dimension to adventure.

English language commands can be entered at any time to manipulate your environment. The command sets are extensive and sophisticated. Dozens of objects are scattered throughout the mazes and buildings. You can pick them up, burn them, throw them, etc. You may need the sword to fight off an ugly little man. Or a steel rod to hold apart crushing walls. Deathmaze 5000 and Labyrinth allow the traditional one and two word commands. Asylum incorporates our Advanced Language Interpreter (ALI), which allows full sentence input.

Deathmaze and Labyrinth consist of over 550 locations!
Asylum tops 1200 locations!

All Tapes £10 ea

ASYLUM Tape £12

THE ESSENTIAL SOFTWARE COMPANY
(Viscounti Ltd.) 01-837 3154
47 Brunswick Centre, London WC1N 1AF

I have a .... microcomputer.
☐ Please send me your software catalogue. I enclose a stamped self addressed envelope.
☐ Please send me ....
I enclose a cheque/postal order for £ ......
(plus 50p post & packing)

Signature ....
Name ....
Address ....
Postcode ....
My ACCESS No is ....

PRACTICAL PRACTICAL PRACTICAL

PROGRAMMING

By TED BALL

WHEN YOU NEED TO SPEED THINGS UP

It is the computer's calculating speed which has made it such a boon to mankind but a good game can often be ruined because a calculation is carried out too slowly.

In microcomputer games, speed is particularly important in moving graphics, where slow processing will give a jerky effect. In strategy games where the computer must calculate to decide its move, a long wait will result in all-too-human boredom.

One important way of speeding up programs is to use tables which allow the computer to look up already calculated values instead of repeating the calculation every time the result is needed.

In its simplest form a "look-up table" is just an array in which each element is the required value corresponding to its index. For example, if we have a program which uses the square roots of the numbers from 1 to 10 we could use an array R dimensioned to 10 with R(I) equal to the square root of I. Whenever a square root is needed it can be obtained as N=R(I), which is much faster than the calculation N=SQR(I).

As an example of a more complicated look-up table, consider the problem of evaluating hands in five-card draw poker. (You do not need to know the game in order to follow the example, and the method can be applied to other games in which runs and pairs are important.) To avoid making the example too complicated I will ignore flushes and the fact that an ace may be high or low in a straight.

The simplified problem then consists of deciding whether a hand contains high cards only, a pair, two pairs, three of a kind, a full house (three of a kind and a pair), four of a kind, or a straight (five consecutive cards).

It would be possible to write separate routines for testing each possible case but this is likely to be very slow. It is not immediately obvious how we can use a table to solve this problem; the key is to arrange the cards in ascending order and look at the differences between the cards.

A difference of zero means two cards of the same value, a difference of one means two consecutive cards, while a difference greater than one means that the two cards cannot contribute to pairs or a straight.

To make this clearer, let us look at a few hands:

2, 3, 3, 5, 6 differences 1, 0, 2, 1
2, 3, 3, 3, 6 differences 1, 0, 0, 3
2, 2, K, K, K differences 0, 11, 0, 0
4, 5, 6, 7, 8 differences 1, 1, 1, 1

In the first hand we have a pair — a single difference of zero; in the second hand we have three of a kind — two consecutive differences of zero; in the third hand we have a full house — a single non-zero difference; in the fourth hand we have a straight, and four differences of one. The pattern of zeros, ones and numbers greater than one — can be seen to be related to the type of hand.

We can obtain a single number from the four differences by replacing all differences greater than one by two (as the actual value of the difference is irrelevant to this type of hand) and regarding the differences as



the digits of a ternary (a base 3 rather than decimal) number. Thus, the four hands above give:
ternary 1021 = decimal 34
ternary 1002 = decimal 29
ternary 0200 = decimal 18
ternary 1111 = decimal 40

If the five cards in the hand, in ascending order, are in the array C, the following simple routine will calculate the index for the hand:

```
100 LET I = 0
110 FOR N = 2 TO 5
120 LET D = C(I) − C(I−1)
130 IF D>2 THEN LET D = 2
140 LET I = 3*I + D
150 NEXT N
```

The value of I calculated by this routine can be used to access an array of dimension 80 containing code numbers corresponding to the type of hand, and these code numbers can then be used to select routines which further refine the valuation of the hand according to the values of the cards.



PRINTING WITHOUT BEING DAMNED

The PRINT statement, like almost everything in Basic, is subject to numerous dialect variations. Some of the variations can be seen if we consider how we might arrange to print at different places on the screen without changing anything except where we are actually printing.

The current print position is marked on the screen by a cursor, and the cursor location is stored in memory where the Basic interpreter can find it. It is possible to change the print position by POKE-ing the different values into the cursor location, but most Basics provide other methods.

The most direct method is found on the Sinclair ZX81, with PRINT AT, and on the TRS-80, with PRINT @. These allow the print position to be set immediately to any part on the screen. The POSITION statement on the Atari machines works in a similar fashion, while on the Apple II the TAB and VTAB functions set the horizontal and vertical position separately. The Pet has keys for cursor up, down, left and right, and these commands can be incorporated into PRINT lists.

It is usually necessary, when using cursor control functions, to keep track of the cursor position. Some Basics provide a function POS which returns the current cursor position, but even without the POS function it is quite simple to use variables to record the cursor position.

All these methods of shifting the print position can be simulated by POKE-ing to a memory-mapped screen. If the screen has M rows and N columns, and the memory location corresponding to the top left-hand corner has address S, then the address for row R and column C is easily seen to be S + N*(R−1) + C−1. To print a string X$ starting at R,C we can use the following routine:

```
1000 LET Z = S + N*(R−1) + C−1
1010 FOR W = 1 TO LEN(X$)
1020 POKE Z+W−1, ASC(MID$(X$, W,1))
1030 NEXT W
1040 RETURN
```

The equivalent to PRINT AT X,Y, "MESSAGE"; is

```
100 LET R = X
110 LET C = Y
120 LET M$ = "MESSAGE"
130 GOSUB 1000
```

The routine can easily be modified to print vertically instead of horizontally (this is not provided in most Basics).

```
1000 LET Z = S + N*(R−1) + C−1
1010 FOR W = 1 TO LEN(X$)
1020 POKE Z + (W − 1)*N, ASC(MID$(X$,W,1))
1030 NEXT W
1040 RETURN
```

The above routines do not alter the simulated print position, so that:

```
200 LET M$ = "SECOND MESSAGE"
210 GOSUB 1000
```

would overwrite the first message. To cause a second message to be printed after the first we can add the following lines to the first routine

```
1022 LET C = C+1
1024 IF C>N+1 THEN GOTO 1030
1026 LET C = 1
1028 LET R = R+1
```

With this modification we can simulate cursor up, down, left, right as follows:
Cursor up: LET R = R−1
Cursor down: LET R = R+1
Cursor left: IF C>1 THEN C=C−1 ELSE C=N; R=R−1
Cursor right: IF C<N THEN C=C+1 ELSE C=1: R=R+1

The above routines test for the left and right edges of the screen and adjust the row and column values accordingly; although no tests have been given to ensure that the print position stays on the screen. However, the latter tests are very important and should be included during the development of a program; it is sometimes possible to eliminate such tests in the final version, provided you are sure that nothing can make the print position move outside the screen.

Graphics



BY GARY MARSHALL

WHEN we can place a shape on a memory-mapped screen by making it up with graphics characters, the next step is to make the shape move round the screen. It is fascinating to make it move in a way that can be controlled by you, the user.

In the better games programs that have been written for the popular microcomputers, a fairly standard arrangement for movement under user control has evolved. It usually involves the use of the numeric keypad, although if a particular micro doesn't possess one, any square block of nine keys can be used.

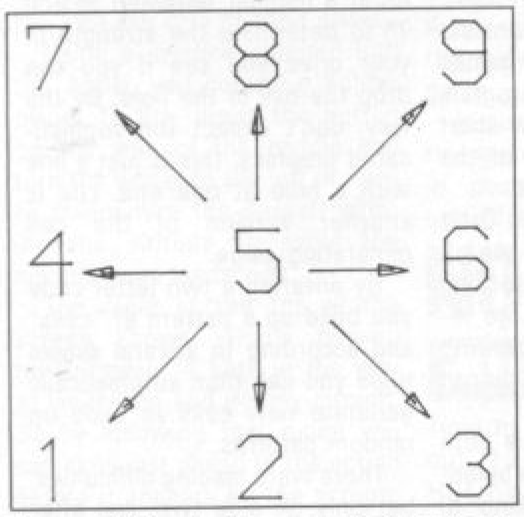


Figure 1: Control keys and directions

The movement control plan is illustrated in Figure 1. The number 5 is central, and is taken to indicate that no movement is required. Since the number 6 is situated to the right of 5, this key is used to indicate that movement to the right is required, and so on with the other keys.

Using the routine given last month to plot a space invader we can write a program to move the invader around the screen. The program should scan the keyboard to see if a control key has been pressed, and if so it should move the invader appropriately.

Thus, if the invader is situated with reference to a screen position, P, and the 6 is pressed, the invader should be moved one place to the right. This can be done by increasing the reference position by one and plotting the invader again.

Movement to the left can be achieved by subtracting one from the reference position. The changes which have to be made to the reference position for all directions of movement are illustrated in Figure 2 for the Pet, which has 40 character positions in a row.

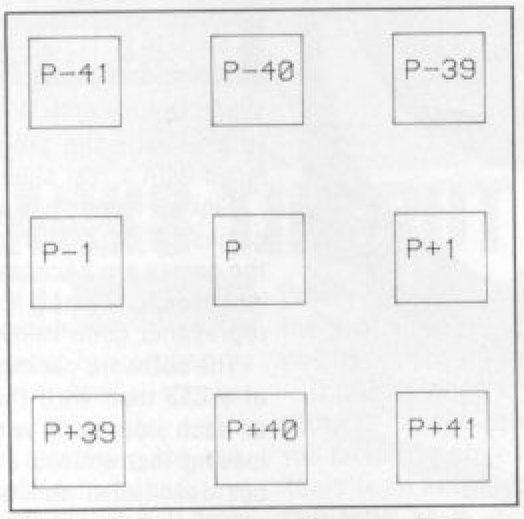


Figure 2: Screen Locations and directions

One refinement is needed, because if an invader, or any other shape, is moved like this, it leaves parts of itself behind so that its movement is characterised by a 'bleeding' which marks its course. To avoid this, the shape can include a surround consisting of spaces, so that the part left behind is a space and no trail is left.

A Basic program, written for the Pet, to draw an invader and move it round the screen as directed, is shown below.

The program lines have the following functions: line 10 clears the screen and line 20 sets the reference position for the initial plot of the invader.

Lines 30 to 50 plot the invader with reference to P and lines 60 to 110 put the border of spaces around it. Line 120 scans the keyboard until a key is pressed, while lines 130 and 140 reject all depressed keys except control keys. Control only passes to line 150 if a control key is pressed, and lines 150 to 230 move the reference position in response to the depressed key before returning to re-plot the invader in the new position.

Notice that the invader can be driven off the top or bottom of the screen, which is not to be recommended. In fact, a good refinement to the program would prevent it.

Removing lines 60 to 110 converts the program to a rather pretty pattern drawer. The movement scheme gives some insight into how the pieces in many games can be moved.

GET THINGS MOVING

```
10 PRINT"CLR"
20 P=33268
30 POKE P-1,255:POKE P,247
40 POKE P+1,127:POKE P+39,255
50 POKEP+40,249:POKEP+41,127
60 POKE P-2,32:POKE P+2,32
70 POKE P+38,32: POKE P+42,32
80 FORI=P-42TOP-38
90 POKE I,32:NEXT
100 FORI=P+78TOP+82
110 POKE I,32:NEXT
120 GET C$:IFC$=""THEN120
130 C=VAL(C$)
140 IF C<1 OR C>9 THEN120
150 IF C=1 THEN P=P+39:GOTO30
160 IF C=2 THEN P=P+40:GOTO30
170 IF C=3 THEN P=P+41:GOTO30
180 IF C=4 THEN P=P-1:GOTO30
190 IF C=5 THEN 120
200 IF C=6 THEN P=P+1:GOTO30
210 IF C=7 THEN P=P-41:GOTO30
220 IF C=8 THEN P=P-40:GOTO30
230 IF C=9 THEN P=P-39:GOTO30
READY.
```

REVIEWS REVI



BEWARE THE BOMBING SPACE BIRDS

ASTROBIRDS AND 3-D ASTEROIDS

The Astrobirds have you in their sights and it is really only a matter of time before you slip beneath their falling bombs.

It is an extremely addictive space attack game in the mode of the Galaxian arcade game. This version is produced by Program Power for the Acorn Atom and has excellent graphics and sound effects.

The tape loaded first time and upon being run produced a good set of instructions and details of point scoring. After pressing the return key the game commences.

The total invasion fleet of 19 Astrobirds shift back and forth across the screen dropping bombs.

The Astrobirds carry out swooping attacks, one by one, on your laser base, which can be hit three times before the game is over. All this is accompanied by the most extraordinary selection of sound effects making full use of the Atom's built-in loud speaker.

When you have successfully cleared the screen the next fleet appears.

As the game goes on the Astrobirds move faster and drop more bombs until you can't cope.

Astrobirds is a most enjoyable game that will give hours of entertainment and just the right amount of frustration. Very good value at £8.95 plus V.A.T., it requires 11 K memory (including 6 K graphics).

Another Program Power tape for the Atom is 3-D Asteroids.

3-D Asteroids is a one-player game in which you manoeuvre your craft through an Asteroid storm without colliding with the meteors.

The controls used are "/", "[", "<", ">" which provide up, down, left and right movement respectively. These keys are a bad choice being bunched together and awkward to use.

Once 3-D Asteroids is running, instructions are displayed briefly, followed by details of the length of the approaching storm (usually 20-40 seconds), a short countdown and you're on your own.

The T.V. screen becomes the "front window" of your spacecraft, and all you have to do is frantically press the correct keys to "skilfully" avoid the approaching asteroids.

The asteroids themselves give a reasonable 3-D effect and are flicker-free, resembling partially eclipsed planets which seem to give a rotating effect. However, trying to avoid these objects alone is not enough to make an interesting game and Program Power have turned a very good idea into a disappointment.

The price is £6.95 plus V.A.T. and it requires 5K memory (including 2K graphics).

CAN LIFE EXIST IN JUST 1K?

SINCLAIR'S GAMES PACK No 1

When there's only 1K of memory to play with, the programmer is faced with a real challenge.

Sinclair have come up with six games for its ZX81 and, although the games are necessarily simple in concept, Games Pack No. 1 represents good value at £3.95.

The software package consists of a C12 tape with three games on each side, along with program loading instructions and a short but descriptive summary of the actual playing instructions.

I particularly enjoyed the Orbit and Meteors games which involve, in the first case docking your spacecraft with cargo — rather tricky; and avoiding meteorites for as long as you can in the second game.

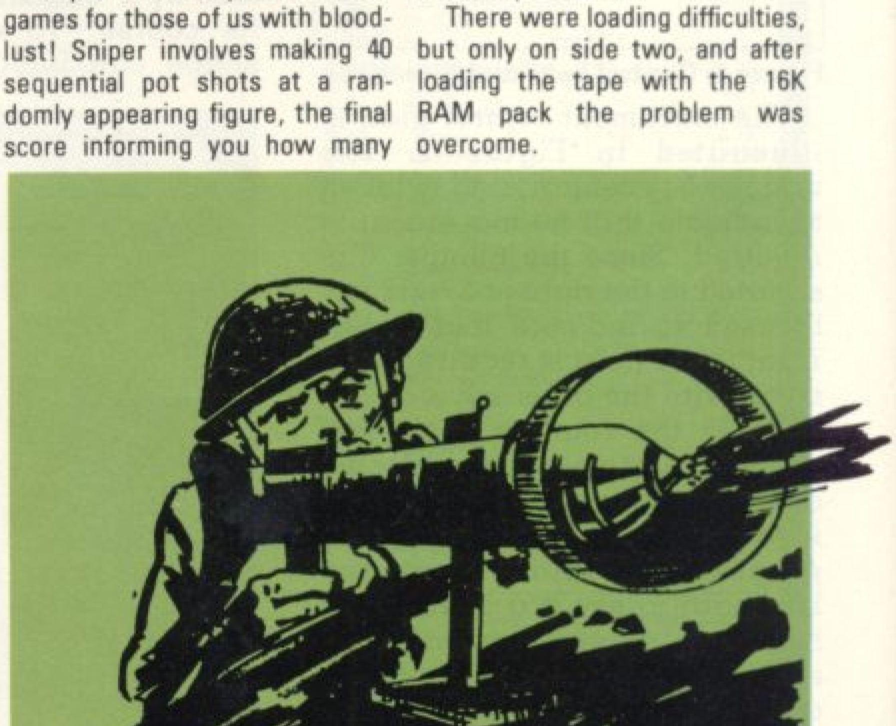
Sniper and Wolfpack are both games for those of us with bloodlust! Sniper involves making 40 sequential pot shots at a randomly appearing figure, the final score informing you how many times you managed to kill him.

Wolfpack is not a wolf shooting game but, in fact, dropping depth charges on to a submarine, this is again hard to master.

The final two games were not so entertaining. Golf asks you to enter a number between 35 and 75 to determine the strength of your drive and see if you can drop the ball in the hole. By the way, don't expect too sophisticated graphics, this is just a line with a hole at one end. Life is another version of the cell generating game.

By entering a two letter code you build up a pattern of "cells" and according to several simple rules you can then automatically generate new cells to build up random patterns.

There were loading difficulties, but only on side two, and after loading the tape with the 16K RAM pack the problem was overcome.



RESCUE MISSION

GORGON

A remote planet's inhabitants are being terrorised by bird-like kidnappers who lift them from the surface and carry them away.

In Gorgon, you are the surface dwellers' best chance of survival, fighting off the waves of aliens in an Apple version of the arcade game, Defender.

Navigating his way above hazardous terrain the pilot can check his course on the radar.

The race that has taken over the planet is devious and brutal sending out bands of fighters to ward off any intruders. They steal the people from the surface of the planet by clutching them in the vice-like grip of their claws.

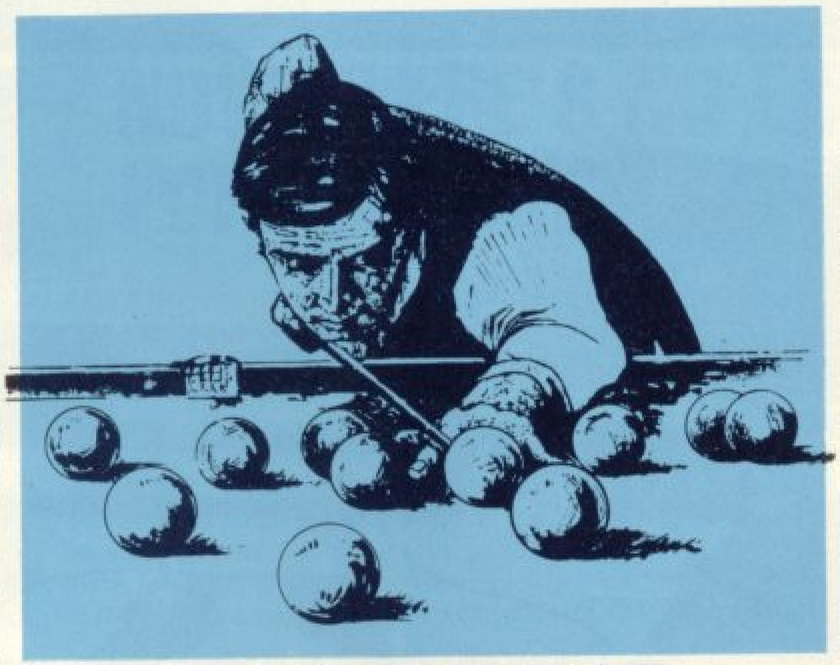
Using a joystick plugged into the Apple, you control a fighter plane. To fire, press the button on the side of the paddle and turn the wheel to the left or right to manoeuvre the aircraft altering the altitude to avoid the mountainous landscape.

The radar at the top of the screen shows what's coming towards you — both in the way of landscape and enemy aircraft. So by following that guide you can keep just ahead of the action before it appears on the screen.

If one of the surface dwellers wandering across the planet is kidnapped the plane's pilot can still swoop into action to save him. By moving the aircraft into position so that the plane is just touching the man in mid-air it automatically releases him from the creature's clutches.

The next step is to land him back on the surface of the planet so that he can run to safety. Your plane gets just three lives. The score is worked out according to the number of attacking ships and Gorgons you destroy, ranging from 20, 40 and 60 points. And if you fail to rescue a man from a Gorgon, or let him fall off your plane through dangerous flying you get 50 points deducted from your score.

Gorgon is a U.S. import and is available through Apple software dealers including SBD Software of Richmond for £18.95.



X MARKS THE POT

SNOOKER

A new skill must be acquired by the players of Atari's snooker game.

Instead of mastering the cue, this game calls for a steady eye in positioning a white cross behind the ball you wish to hit. Wherever the cross is set, marks the spot where your ball should end up.

It takes a while to perfect your shot, so have a practice before you tackle the professional game. There is an untimed game to get the hang of it. You can soon judge and apply the power of your shot depending on where the balls are positioned on the table.

If only a slight touch with the cue is needed, then hit the fire button on the joystick when the column on the left hand side of the screen and table is at the bottom. That is the marker indicating the power behind the shot.

After the ball has been hit the white cross disappears momentarily from the screen. When all the balls have settled into their new positions the cross will reappear on the snooker table ready for your next shot.

Measure your shot and try to work out exactly where all the balls will go. The power indicator constantly moves so you don't have long to wait for it to reach the level you want.

Atari's software men come up to scratch in this game with the usual good graphics and colours but it takes a while for a player to grasp that he cannot actually line up his cue with the ball he wants to hit. It costs £19.95 and is available from North London based distributors, Ingersoll.

NOT FOR THE PARANOID HIKER

HITCH-HIKERS' GUIDE TO THE GALAXY

Time to grab your towel and set out to discover the galaxy. Harrow-based Supersoft's adventure game, based on Douglas Adam's **Hitch-hikers' Guide to the Galaxy** is a well thought-out attempt to reproduce the imaginative radio/T.V. series.

Extremely well written and programmed by Bob Chappell, the game favours those who watched the T.V. programme or read the two books available from Pan: **Hitch-hiker's Guide** and **Restaurant at the End of the Universe** — at least they will know what a Vogan is and how to use a Babel fish.

The object of the game is to take and then place a certain number of objects in certain places to gain points.

On your way to this elusive score you are bound to get lost in the "Total Disorientation Vortex Maze" or get lost in space. When this happens to you don't despair too much, there is a way out!

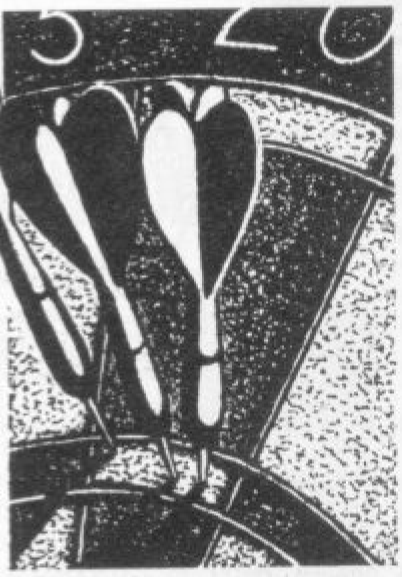
If you try and pick-up more objects than you can carry, then "Eddie", your shipboard computer, prompts you, you'll just have to drop something, but which one! Each object has its own key word for picking it up, or dropping it, e.g. if you wanted to pick up, "a big fat book of Vogan poetry" you could type "take book".

The usual command words apply to this game like: take, get, look, read. As in most other adventure games, using the "save" command enables you to save your exact position, with every object you've worked so hard to get or where you've dropped it, on tape.

Supersoft has received so many calls for help about Hitch-hikers that they now send a "hints" list out with the program — they even had a request from South Africa! I think I'll start a lost Hitch-hikers' club.

It costs £17 in cassette form and runs on a 32K Pet. Good Hitch-hiking!





NOW THERE'S NO EXCUSE FOR POPPING DOWN TO THE LOCAL

DARTS

About the only thing the new Atari darts game doesn't have is that familiar T.V. commentator's soaring screech announcing the high score 'Wun-hundred-an-eightyyy!!'.

The graphics on this game, which runs on the Atari 400 and 800 personal computers, beats most others into a cocked hat. The picture on the screen shows the interior of a pub and it looks convincingly like the local with wooden beams lining the walls and ceilings.

A figure stands on the left hand side of the picture representing the darts player. His jumper changes colour according to whoever's turn it is.

When the game is in play the darts board itself is clearly marked out at the bottom right hand corner of the screen with the dart throwing hand hovering nearby.

An ear catching feature of the game are the sound effects. If you throw a dart which hits the wire on the board you hear the realistic chink of metal against metal and then a soft thud as it touches down on the carpet.

And if you miss the board completely but get the wall instead the sound effects are once again spot on, crashing into the wall and dropping to the ground with a clatter.

Kick off play by selecting the type of game you want from 301 to 901 and choosing a skill level to suit you between 0 and 9. Level 6 is about average and a good one to start on. Once you have typed in the player's initials the board appears in close-up on the screen, press start and you're off.

Then you play just like any 'normal' darts game. The computer keeps tabs on the score and flashes it up on the screen after each player has had his go.

But it's not as easy as it looks at first. The hand holding the dart hovers and you have to judge carefully when to fire.

So you have to make sure the finger tip is pointing at the numbered section of the board you want to hit and fire at that exact moment. Like any game involving skill it makes you want to improve your performance and continually beat your opponent. The game is for either one or two players.

At the beginning and end of the game a tune starts to play . . . and play . . . and play (and good graphics too) . . . pleasant to listen to at first but, after a while, it becomes tedious. The programmer concerned must have put a lot of effort into it but perhaps he could have spent his time better.

Apart from that, a standards setter.

Darts is available from Britain's Atari distributors, Ingersol for £29.95.

THE SUBTERRANEAN TERROR

WUMPUS

For those of you with the good fortune never to have come across a Wumpus, let me inform you that this species of cave dwelling amphibian is absolutely deadly.

The Wumpus inhabiting Texas Instruments' new T.I. 99/4 computer package is pretty typical of the species in this respect.

When you are hunting down his lair you must use all due caution. Should you blunder in on him at home, he will wolf you down without giving you a chance to fire. In fact your only chance of killing a Wumpus is to fire before you see him. Loose an arrow into his cave and you'll live to fight another day — but choose carefully because the Wumpus does not give those who miss a second chance.

A hopeless task it might sound in a massive complex of caves and twisting passages but luckily the Wumpus leaves clues to his whereabouts. In fact every cavern within two of his lair bears the taint of the creature.

But there are other hazards in this complex of caverns. Slime pits for example. These revolting green traps can do for you just as surely as the Wumpus, who — by the way — will wallow quite contentedly in the middle of one of these.

Among the other fauna present is a kind of bat with an extremely good memory. Once you have wandered, however innocently through his roost he will have committed your disturbing of his peace to memory and he will begin to grieve over it.

He works himself up into such a tizzy that next time you enter his cavern he will grab you and deposit you elsewhere.

Experienced Wumpus hunters — very few and far between — will search out the creatures in especially tortuous tunnels. They may attempt to do it very fast or they may even go in blindfold! Foolish people!

Wumpus brings the art of logical deduction to life, with just a pinch of luck as well. The graphics and sound effects are good and the cartridge costs £19.35 from T.I.



THE NEW TEXAS TI 99/4A 42K PERSONAL COMPUTER ONLY £275.00 +VAT

LOOK AT THESE FEATURES

9900 16 BIT PROCESSOR 3·5 MHZ ● 26K ROM INCLUDING 14K BASIC ● 7·6K GRAPHICS LANGUAGE INTERPRETER ● 4·4K MONITOR ● 16K USER RAM (EXPANDABLE TO 48K) ● HI-RES GRAPHICS 192 × 256 ● 16 COLOURS WITH FOREGROUND, MIDDLE, AND BACK GROUND ● FULL MEMORY MAPPED SCREEN ● 5 OCTAVES SOUND FROM 110Hz TO OVER 40000 ● 3 SIMULTANEOUS TONES + NOISE GENERATOR ● SOUND THROUGH YOU OWN TELEVISION ● PLUGS INTO ANY PAL COLOUR TV (B/W GIVES SHADES OF GREY) ● INTERFACE TO CONTROL 2 CASSETTE PLAYERS (AUTO COPY AND UPDATE FROM ONE TO THE OTHER) PLUS MANY MORE SUPER FEATURES ● 12 MONTH GUARANTEE ● OPTIONS INCLUDE: BIG RANGE OF SOLID STATE PLUG IN SOFTWARE ● RS232 INTERFACE ● THERMAL PRINTER ● DISK DRIVES ● SPEECH SYNTHESIZER ● JOYSTICKS ETC ETC.



Please send me
T199/4A COMPUTERS (Inc.
Power supply modulators
and cass interface).
Please send me details and price list. (For which I enclose a large S.A.E.)

Name ____________

Address ____________

____________ Phone ____________

I enclose cheque for [ ] (£316.25 per computer including £41.25 VAT)
Please charge my Access/Diners Club Card.
Number [ ]
or telephone your card order during shop hours to:-
Watford (0923) 44057

Signed ____________

Send to The Computer Centre, Watford, Ltd.
150 High Street, Watford, Herts. WD1 2EN

Video Genie

13K ROM version available

16K £279 + VAT



- ★ Latest version with vu-meter & extra keys
- ★ 16K RAM, 12K Microsoft Basic
- ★ Includes software, manuals and leads
- ★ All our machines are fitted with lower case characters as standard
- ★ 32K Ram memory version of Video Genie £329 + VAT

£329 + VAT 32K RAM

Optional Extras

- The unique 1K BIONIC' Rom £29.50 + VAT
- Sound unit £15 + VAT
- Double joysticks with software £28 + VAT
- Lower case characters with '£' sign £20 + VAT

We stock a wide range of Genie accessories for the businessman and the hobbyist, Word processing, stock control, ledgers systems plus games. Refer to catalogue

BIONIC ROM

The Rom enhancement for your Video Genie will add the following immediately accessible features to your machine:

- Lower case driver
- Keyboard debounce
- Shift lock
- Repeat key routine
- Screen printout
- Cursor select
- Keyboard lock
- Bleeping keyboard

etc.

Available only from us. Kit £25 + VAT fitting £4.50

SAVE!



EPSON MX-80

Letter quality matrix printer, has full software control of 40, 88, 66 or 132 columns 80cps bidirectional, disposable print head. There's lots of printers to choose from, but once you have compared you will find it hard to pass up to the MX-80. £ call

Video Genie interface £35 + VAT
Other interfaces available.

ATARI®

400 & 800
Computer Systems

ATARI 400 £295 + vat
ATARI 800 £543 + vat

ACORN ATOM



8K ROM, 2K RAM BUILT £149
12K ROM, 12K RAM BUILT £229
Power supply £10.20
Colour modulator £23 all plus VAT

Available shortly

- The BBC Microsoft basic upgrade
- 'Plug in' disc drive unit

Phone for availability of VIC 20 *Computer*

Q-Tek Systems Ltd.
2 Daltry Close Old Town
Stevenage Herts
Tel: (0438) 65385

Send £1 for latest catalogue (refundable). Please add vat to all items. Orders under £50 add 60p p + p otherwise carriage at cost

Circle No. 135

REBEL AGAINST FARSIDE'S PRINCE

TAWALA'S LAST REDOUBT

Benthi is the ruthless rebel leaderene with just 100 men and 15 rifles to her name and a planet to conquer, in Tawala's Last Redoubt.

This strategy game is the latest in the Galactic Saga series set on the planet of Farside which is ruled over by the selfish Prince Tawala.

The game takes its name from Tawala's fortress which Benthi stormed to win a famous victory. Your task is to recreate her tactics and planning which brought this victory about.



At the start your forces are hopelessly outnumbered and badly equipped. But using your intelligence officer's reports wisely and sending messengers to Farside's other chiefs and spies to watch for Tawala's approach, you build up and stay out of Tawala's reach until you are ready to take on his Last Redoubt.

Benthi's only advantage is the intelligence reports of Chief Paoli's team. This right-hand man knows Farside's layout like the back of his hand. He has dossiers on each of the other four chiefs, Anson, Beonj, Covoi and Dumas — knowing which villages or camps they control, their strengths and weaknesses.

Will the ruthless Chief Dumas take your offer of money and send you 100 men or will he return your messenger's head on a plate? While awaiting developments send spies to discover Tawala's movements — is he marching on your camp? He probably is and using Paoli's map you had better order "Break-Camp" and move on.

When you feel Benthi's forces are ready it is time to attack Redoubt and you must move your army to Tawala's stronghold. "Attack Redoubt" flashes on the screen and you move your army in. Then all you can do is sit back and await the outcome, hoping your forces are well equipped and numerous enough to defeat Tawala.

It runs on an Apple in 48K, costs £15.95 and is available from Pete & Pam Computers of Lancashire.

UNDER AND OVER THE WALL

ESCAPE FROM COLDITZ



The most notorious of World War II prisons Colditz was famed for the tough time POWs had in escaping and the few successful attempts recorded.

In Escape from Colditz you're given just as hard a time as those allied soldiers went through to get out of the notorious prison castle.

Helping you out at the start of the escape attempt are your fellow prisoners of war who have amassed a selection of goodies to aid you.

On the list are things like a trenchcoat, a grappling iron, a map of the district, money, chocolate, tobacco and a gun. Remember that some Germans are particularly susceptible to bribes and for the price of some sought-after chocolate they may turn a blind eye to your escape.

Guard dogs, locked doors and searchlights add to your problems.

The Sharp MZ-80K, which the game runs on, understands only a few word commands. You can instruct it to move you from one place to another or to take actions when necessary. As in all the usual adventure games you must give commands using words like get, take, search, and directional instructions like north, south, up and down.

It's fun to play but like most adventure games you end up banging your head against a wall with frustration when you keep going round in fruitless circles. London based Sharpsoft supply Escape from Colditz on cassette from £8.95 on a 48K Sharp.

WHAT A LOAD . . .!

SHIP OF THE LINE

Two games from Croydon based Premier Publications, who have the audacity in the light of this cassette, to style themselves "Britain's biggest hobby software specialists".

If the rest of the software is as badly presented as this cassette then they should think again!

Ship of the line proved impossible to load, and this was not surprising when the program is interspersed with people talking!

Alpha-square, which was a very unreliable loaded, is a simple letter puzzle where the 24 letters A to X are arranged in a 5×5 grid, with one empty space. The object — just like those plastic puzzles — is to get the letters into alphabetical order moving individual, a whole row of letters.

The instructions come on a scrappy piece of paper, but were quite clear. The graphics are good with no flashing screen a letter move, and the cassette sells for £3.95.

It was a pity about Ship of the line which costs £5.95 as it seemed to be quite a well thought out warship game, with varying wind direction to complicate the tactics.

It runs on a Sinclair ZX81 with a 16K RAM pack.

Also available for the Sinclair's new memory pack are two games from JRS Software of Worthing, which use the graphics facilities near their best.

Slalom, £4.95, is a race against time. You have to negotiate 14 posts, making sure that none are missed, or that none are hit. The concept of the game, and its implementations, are good. However, with a little thought it could have been much better. The posts are all in a straight line and equidistant. A simple key sequence of: cursor down, cursor down, cursor right, cursor right and so on gets you to the finish safely.

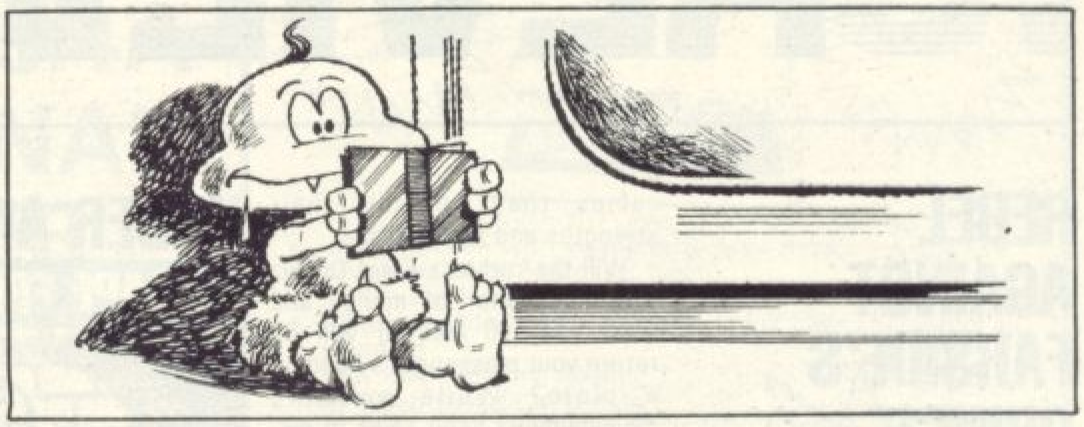
Black Holes, £6.40, is quite a fiendish game. A pattern of reverse field zeros approaches constantly. Within this pattern is a pathway to be navigated using the cursor left or right keys.

In both these games the documentation is not too hot.



DOWN TO BASIC

BY MOIRA NORRIE



DIVIDING RULES

By experiment you may have already discovered the order in which a computer will perform arithmetic operations when faced with a choice.

In a simple program like:

```
10 PRINT 3+2*5
20 END
```

the answer would be 13 because, when faced with a choice between multiplication and addition, it will always do the multiplication first.

Similarly, by trying other examples, you would find that it always gives preference to the multiplication and division operators over the addition and subtraction operators.

So 3-4/2+6 gives the answer 7 and 4*2-3 gives the answer 5.

What would the answer be in the following case? 12/6*2. Here the computer has a choice between multiplication and division. If the division is done first, then the answer will be 4; if the multiplication is done first, the answer will be 1. Multiplication and division are said to be of "equal precedence", meaning that there is no hard and fast rule as to which one will be done first. In this situation, the rule that is adopted is that the computer works from left to right — so that in this case it would do the division first; not because it has any natural priority over the multiplication, but because it occurs first as we read the expression from left to right. Addition and subtraction are also of "equal precedence".

As yet, I have not mentioned the exponentiation operation (i.e. working out powers of numbers). Exponentiation has priority over any of the other operations.

3**2+5.

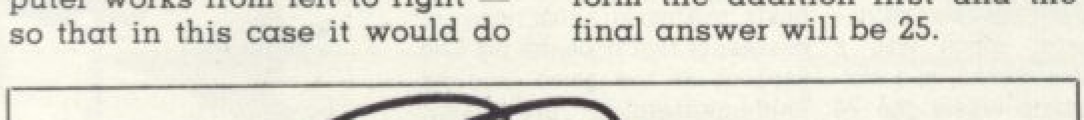
This expression would therefore give the answer 14. (Remember — exponentiation is represented by either "**" or "^".)

At this stage, these rules of precedence may seem very complex, but the important thing at the moment is that you learn to be careful when writing expressions for calculations. Don't worry — if in doubt, try it out and see what happens!

If at any time you wish to override such rules of precedence (or if you are not sure of the rules of precedence), you can use brackets. For example:

(3+2)*5

will cause the computer to perform the addition first and the final answer will be 25.



CALCULATING PLUS

You are now in the position that you should be able to write programs to perform any straightforward calculation. You may be asking yourself: "Why use a computer rather than a simple calculator?" One of the features of using a computer is that you can write a program which will perform the specified calculation for any set of values and not just one particular set of values as you have done until now.

To illustrate this, I will return to the simplest of examples — a program to add two numbers. This time, I will write a program that will add any two numbers — these numbers will be provided when the program is RUN.

```
10 INPUT A,B
20 PRINT A+B
30 END
```

This program uses "variables" A and B to describe the calculation to be performed on the numbers.

If you RUN this program, the computer will wait for you to type the values of A and B when It encounters the "INPUT" instruction. It will print the prompt "?" so that you will know that it is waiting for "input". You then type in the required values, separated by commas if there is more than one, then press the "Return" key. Therefore, for the above program you should have something that looks like:

"? 3,2" printed by the computer.

In this example, I used the names A and B to represent the two values. As these are only "dummies" to allow us to des-

cribe the operations the computer has to perform, it is not significant that I used these particular names. Some versions of basic restrict you to names consisting of a single letter or a single letter followed by one of the digits 0,1,2,3,...9. The following are examples of names that could be used: A, X, Y2, T9.

Other versions can cope with longer names for variables. This means that you can have more meaningful names such as "PROFIT" or "VALUE 66". Note that I have always written my programs in uppercase letters.

Again, many systems are more flexible and permit lowercase and uppercase letters. I shall always use the more restricted forms as my programs should then work, as they are given, on the majority of systems.

REPEAT FIVE TIMES

Another powerful feature of computers is that it is easy to repeat calculations. It is no more difficult to write a program to repeat a calculation a thousand times than it is to write one to repeat it five times.

The programs I have looked at so far have been of the form

INPUT data
PRINT answer to calculation on data

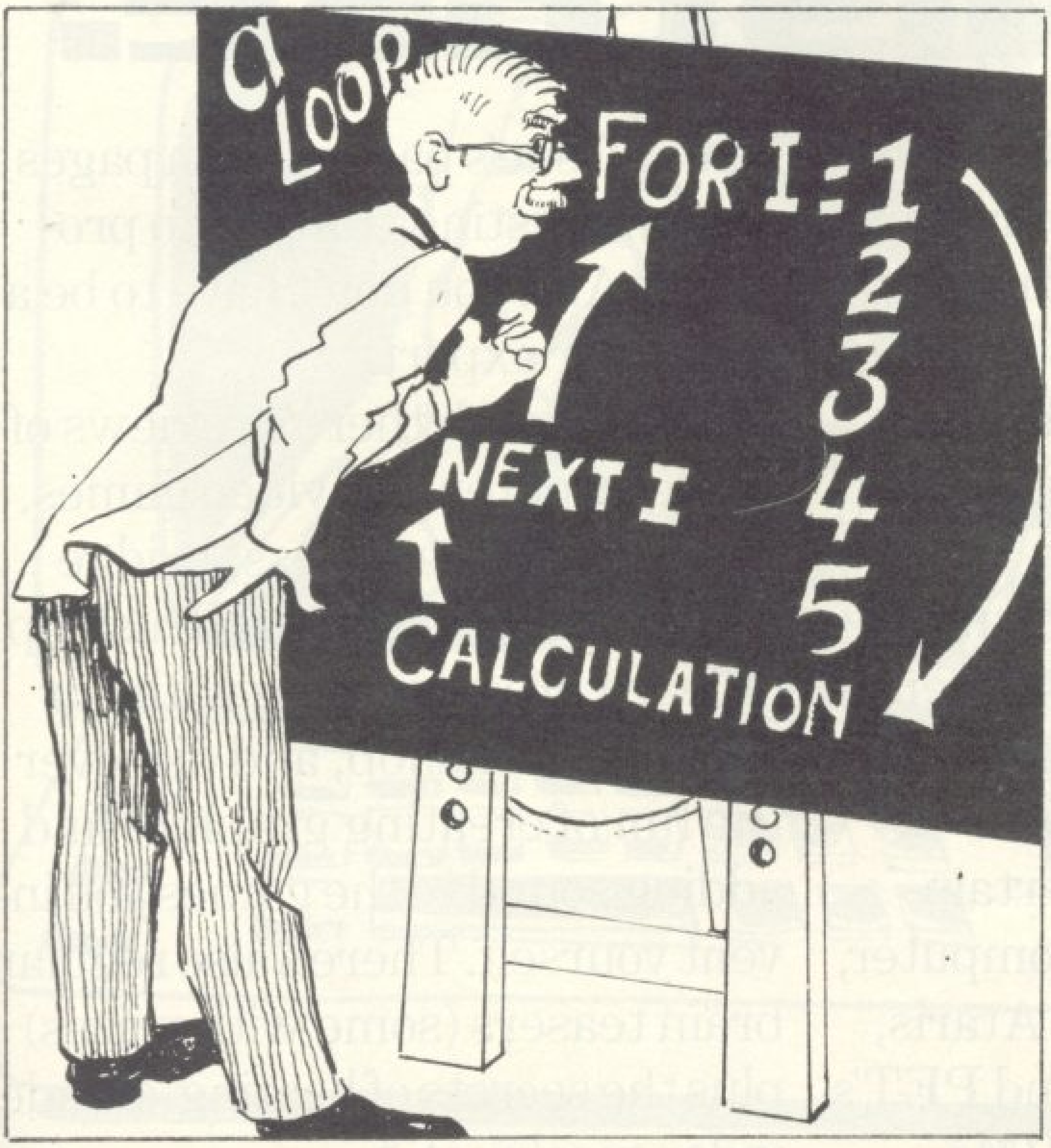
Now let's look at examples where these instructions are repeated a given number of times. For example, I might have a program of the form:

Repeat five times
INPUT data
PRINT answer to calculation on data
end of repeat

I have used a "loop". In this example, I "loop" five times — meaning that I loop back and repeat the instructions five times. To illustrate how you can write a program to do this, I'll write a program to add, not one pair of numbers, but five pairs of numbers.

```
10 FOR I=1 TO 5
20 INPUT A,B
30 PRINT A+B
40 NEXT I
50 END
```

Two new instructions have been introduced — the FOR statement and the NEXT statement. These will be discussed in more detail next month. For now, it suffices to say that they bracket the instructions to be repeated, and that the variable called "I" acts as a count of the number of times round the loop.



MESSAGES IN QUOTES

The PRINT instructions used so far have been used to print the answer to a calculation. PRINT instructions can also be used to print messages. To do this you simply enclose the message that you want printed in quotes. A simple program to illustrate this is:

```
10 PRINT "THIS IS A TEST"
20 END
```

I will leave you with the following example program. It includes loops and the use of the PRINT instruction to print messages. Try running this program and then see if you can work out what each instruction does. I will go through it in detail next month.

```
10 FOR I=1 TO 2
20 FOR J=1 TO 4
30 PRINT "XXXX     XXXX     "
40 NEXT J
50 FOR K=1 TO 4
60 PRINT "     XXXX     XXXX"
70 NEXT K
80 NEXT I
90 END
```

NEXT ISSUE

Most computer games involve graphic symbols — these are the building blocks used for drawing pictures on the screen. Many of the versions of Basic developed for microprocessor systems include special instructions for graphics. The more specialised instructions will be dealt with later in the series. Next month, I will describe how you can achieve simple graphical displays using the PRINT instruction.

NEXT ISSUE

"My finger slipped, I hit the button, and nuked Washington by mistake."

Whether your kind of fun is saving the World in a war game, sharpening your chess strategy or piloting a 747, computer games reach new levels of exhilaration in terms of excitement, intellect and dexterity.

And, to help you get the most fun out of your computer, there's a brand new monthly magazine: Computer & Video Games.

It brings the best entertainment out of all types of computer, from personal Sinclairs, Ataris, Tandys, VICs, Apples and PET's right up to mainframe IBMs.

Every issue's packed with pages of games listings for you to program. And you don't have to be a computer expert.

Each month there's reviews of new computer and video games, regular pages on chess, bridge and mainframe games. Brush up or learn programming with our regular workshop, and discover the fun of creating graphics and adding sound to the games you invent yourself. There's also regular brain teasers (some with prizes) plus the secrets of beating arcade video machines.

Computer & Video Games is packed with new levels of stimulation for people who get fun out of computers.

The second great issue is out today at all good newsagents.

And on the front cover you'll find the programmers most useful little tool. A template to run up and down listings to prevent you skipping lines.

Saves a lot of de-bugging time! Using the template, you can enter what is probably the silliest competition on which you've ever bent your brain.

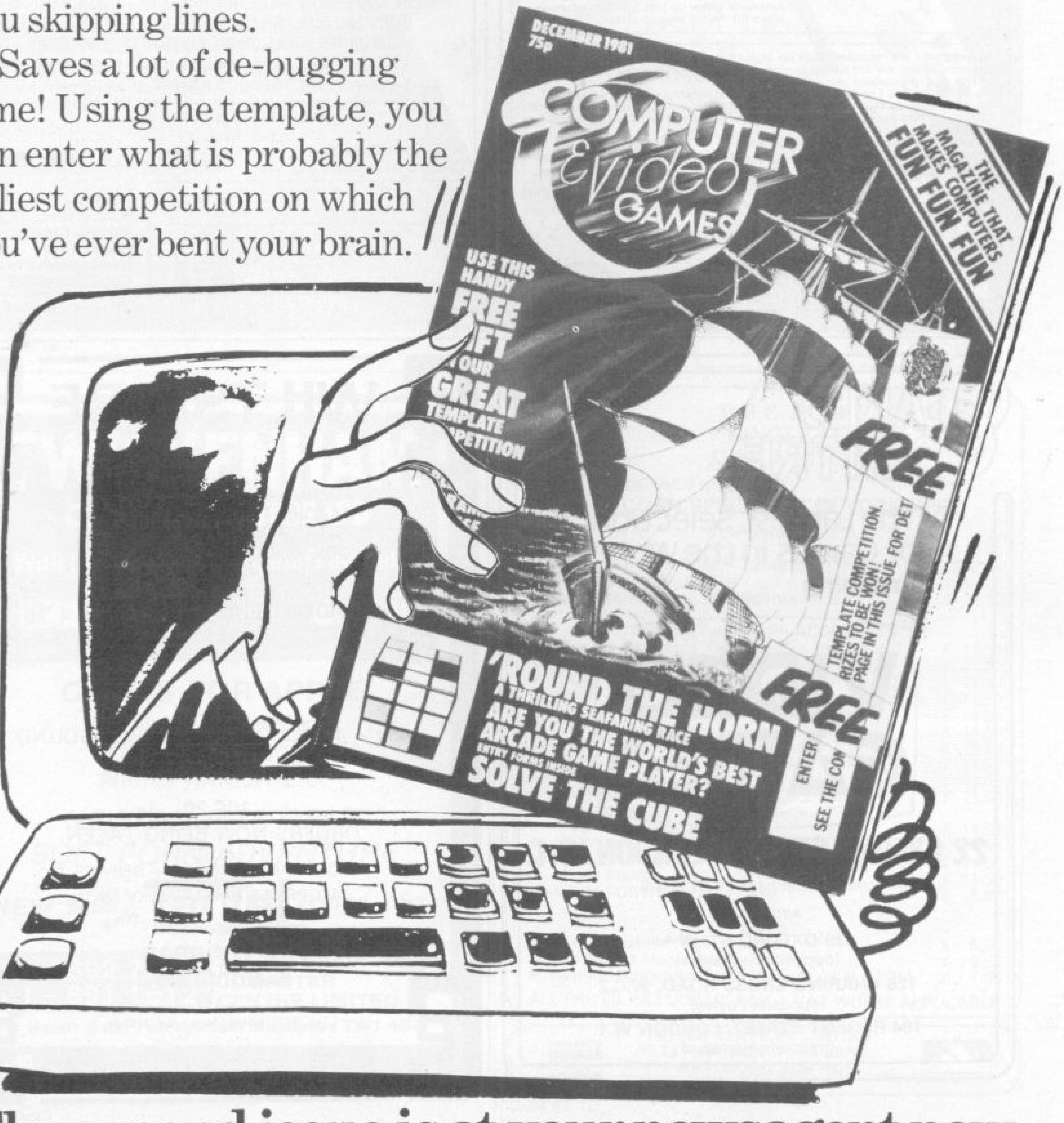
I would like to take out an annual subscription. I enclose a cheque/P.O. for £10, (£20 overseas) for twelve issues. Computer & Video Games, Bretton Court, Bretton, Peterborough PE3 8DZ.

Name ________________________

Address ________________________

Computer & Video Games.

The magazine that makes computers fun.



The second issue is at your newsagent now.

At last. A watch that's fun.



Imagine. It's a cold damp winter's day. You return to your car to realise that you've left the lights on all day. You kick the car and stomp off to phone for help. An hour later you return to await the arrival of the mechanic. Back in your car without lights or radio, you think that sometimes life is anything but fun!

You reach into your pocket and take out a watch about the size of a tiny calculator. You press the time button and see you should have been home about an hour ago. You press the game button and start to play. The game's called 'Lion' and features a number of electronically controlled 'Kings of the Jungle'. You have to stop them escaping from their cage by moving two lion tamers into their path. Suddenly life is fun again, the mechanic arrives and after he has a few games you're on your way.

There's more good news. There are five such games in the Game and Watch series from CGL – Headache, Parachute, Octopus, Lion & Manhole. Sometimes life can be fun.

Game and Watch

You can buy Game and Watch products at larger branches of Boots, Rumbelows, Selfridges and Hamleys.

CGL

Circle No. 141

TWICKENHAM

COMPUTER CENTRE LTD

With the best microcomputers available

VIC-20 · commodore · apple II

GAMES FOR APPLE

Missile Defence
High Res Soccer
Alien Typhoon Etc.

NEW! ADULTS ONLY.
SOFT PORN ADVENTURE

NEW *Prestel with* **Tantel** £170.00 + VAT.

01 – 892 7896
01 – 891 1612

TWICKENHAM COMPUTER CENTRE LIMITED

VISA

72, Heath Road Twickenham Middlesex TW1 4BW

Circle No. 142

ACORN COMPUTER

B.B.C. ROM SETS
SINGLE FLOPPY DISK UNITS (100K)

WRITE FOR DETAILS to:-

the ACORN SPECIALIST IN YORKSHIRE

New Hardware

★ ACORN Atoms	From £140.00
★ ACORN GP80 Printer + Cable	£232.00
★ ATOM Word Pack ROM	£ 30.00
★ Extra Memory per 1K (Recommended)	£ 3.20

New Software from ACORNSOFT

★ GAME 1 Asteroids + Subhunt + Breakout	£ 11.50
★ GAME 2 Dogfight + Mastermind + Zombie	£ 11.50
★ GAME 3 Rat Trap + Lunar Lander + Black Box	£ 11.50
★ GAME 4 Star Trek + Four Row + Space Attack	£ 11.50
★ GAME 5 Invaders +Wumpus +Reversi	£ 11.50
★ GAME 6 Dodgems + Simon + Amoeba	£ 11.50
★ GAME 7 Green Things + Ballistics + Snake	£ 11.50
★ GAME 8 Stargate + Go + Moko + Robots	£ 11.50
★ SOFT VDU New character set design	£ 11.50
★ MATHS PACK 1. MATHS PACK 2	£ 11.50
★ UTILITY PACK 1. Disassemble + Fast COS + Renumber	£ 11.50
★ ATOM DATABASE. Versatile & Efficient	£ 11.50
★ PEEKO-Processor Simulates micro	£ 11.50
★ ATOM FORTH. Full implementation	£ 11.50
★ ATOM FORTH. User's Guide	£ 5.00

Books

★ ATOM Business by J. Phipps	£ 6.95
★ The ATOM Magic Book	£ 5.50
★ Getting Acquainted With Your ACORN ATOM	£ 7.95

ALL PRICES INCLUDE UK P&P + VAT WHERE APPLICABLE

BARCLAYCARD · VISA

ELTEC SERVICES LIMITED
231 MANNINGHAM LANE
BRADFORD BD8 7HH
TEL: 0274-491372

Circle No. 143

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ALGORITHM A process or set of rules to carry out a task or solve a mathematical problem.

ARRAY A series of items (data or information) arranged to form a meaningful pattern.

ARRAY SUBSCRIPT An indexing notation e.g. X(1), X(2) where 1 and 2 are subscripts, used in an array.

BITS BInary digiTS. The 0s and 1s that make up the binary code computers understand.

BUG A slang term given to a mistake in a computer program which prevents it working. It can refer to a mechanical, electrical or electronic defect in a computer.

BYTE A term to measure a number of bits (binary digits), usually eight bits to a byte.

CHIP A tiny piece of silicon which holds all the components that make up a microprocessor.

CHARACTER STRING A sequence of characters in a row.

CONCATENATE To unite in a series, link together or chain.

CURSOR A small square-shaped mark which indicates where a character will appear on the screen. It can be moved around the screen using certain keys on the keyboard.

DECODE To interpret and determine meaning, and to translate a code into more understandable form.

ELECTROLYTIC CAPACITOR A component which allows the passage of AC current but not DC current.

ELLIPTICAL Of or relating to an ellipse or ellipsis.

ELLIPSIS/ELLIPSE Omission from sentence of words needed to complete construction or sense.

ERRATA (Erratum) Errors in printing or writing, usually in lists.

EXPONENTIATION A mathematical operation used to calculate powers of numbers.

FOR . . . NEXT A Basic statement which is an instruction used for repetition of a sequence of program statements (see loop).

GOSUB A Basic command instructing the computer to go to a subroutine in a computer program.

GOTO A Basic command which tells the computer to jump to another line in a computer program.

GRAPHICS CHARACTERS The name given to pictorial representation of data such as plotted graphs, engineering drawings and computer games.

HARDWARE A general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INPUT Information which is fed into the computer.

INTEGER A number which does not contain a decimal point, i.e. a whole number.

K Abbreviation for Kilobyte.

KILOBYTE A measurement of memory capacity. 1024 bytes of memory. So 8K is equivalent to 8192 bytes.

L.E.D. (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal displays in calculators and watches.

LET A Basic statement which defines a variable. E.g. LET A=0.

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

LOGICAL NETWORK A series of interconnected points linked by communications facilities.

LOOP A Basic function referring to the repeated execution of a series of instructions for a fixed number of times.

MEMORY A measurement of how much information a computer can cope with.

MEMORY MAPPED SCREEN Data called up on the V.D.U. screen to help when processing scattered program fragments in the computer's memory.

MESSAGE A sequence of letters or symbols which has some sort of meaning.

NEXT (See FOR . . . NEXT).



OSCILLATE To undergo high-frequency alternations as across a spark gap or in a valve transmitter circuit.

POKE An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

PRINT A Basic command which tells the computer to perform a calculation in a program.

PROCESSING Handling and manipulating computer data.

RAM (Random Access Memory) This is a number that can only be repeated by chance. As it is like throwing a dice these numbers are useful in games.

ROM (Read Only Memory) A memory chip which can only be read from and not written into.

ROUTINE A set of coded computer instructions used for a particular function in a program.

SCAN To examine stored information for a specific purpose as for content or for arrangement.

SOFTWARE The programs fed into a computer, which make them perform what we want them to do.

STRING A connected sequence of characters, words or other elements usually symbolised with the $ (dollar) sign.

SUBROUTINE A computer program routine that is translated separately, generally used in several computer programs or several times in one program.

TERNARY Relates to the number system of the base three.

USER PORT The entry channel which a data set is attached to.

VALUE The numerical quantity of a data element, and is the number assigned to a variable.

VARIABLE A symbol whose numeric value can be changed at all times. It is used when writing programs.

NOW IN STOCK

THE NEW & *EXCITING* TRS80 MODEL III



48K **£619** + VAT

The Radio Shack TRS-80™ Model III is a ROM-based computer system consisting of:
- A 12-inch screen to display results and other information
- A 65-key console keyboard for inputting programs and data to the Computer
- A Z-80 Microprocessor, the "brains" of the system
- A Real-Time Clock
- Read Only Memory (ROM) containing the Model III BASIC Language (fully compatible with most Model I BASIC programs)
- Random Access Memory (RAM) for storage of programs and data while the Computer is on (amount is expandable from "16K" to "48K", optional extra)
- A Cassette Interface for long-term storage of programs and data (requires a separate cassette recorder, optional/extra)
- A Printer Interface for hard-copy output of programs and data (requires a separate line printer, optional/extra)
- Expansion area for upgrading to a disk-based system (optional/extra)
- Expansion area for an RS-232-C serial communications interface (optional/extra)

All these components are contained in a single moulded case, and all are powered via one power cord.

Disc Drives Kit with 2x40 Track Drives — **£599** + VAT
Disc Drives Kit with 2x80 Track Drives — **£729** + VAT
Add **£25** for Installation

NEW

ACORN ATOM

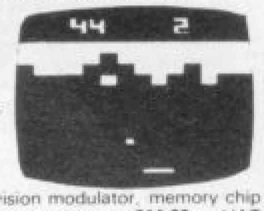
UNIQUE IN CONCEPT — THE HOME COMPUTER THAT GROWS AS YOU DO

Fully Assembled **£149** + VAT



Special features include • Full Sized Keyboard • Assembler and Basic • Top Quality Moulded Case • High Resolution Colour Graphics • 6502 Microprocessor

TV GAME BREAK OUT



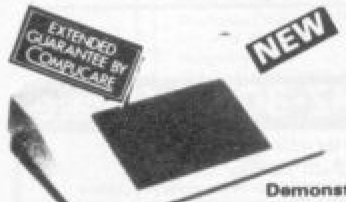
Has got to be one of the world's greatest TV games. You really get hooked. As featured in ETI. Has also 4 other pinball games and lots of options. Good kit for up-grading old amusement games.

MINI KIT — PCB, sound & vision modulator, memory chip and de-code chip. Very simple to construct. **£14.90** + VAT **OR** PCB **£2.90** MAIN LSI **£8.50** Both plus VAT

NEW

TANTEL

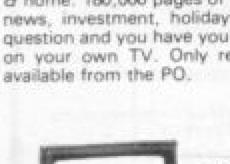
ONLY **£169** + VAT



Demonstation available at our showroom

PRESTEL BY TANTEL The greatest thing since television & telephones. Communications at your fingertips for business & home. 180,000 pages of up-to-date information on travel, news, investment, holidays, hotels etc etc. Ask Prestel a question and you have your answer in seconds in full colour on your own TV. Only requires a telephone jack socket available from the PO.

HITACHI PROFESSIONAL MONITORS



9" — ~~£129~~ **£99.95**
12" — ~~£199~~ **£149**

- **Reliability** Solid state circuitry using an IC and silicon transistors ensures high reliability.
- **500 lines horizontal resolution** Horizontal resolution in excess of 500 lines is achieved in picture center.
- **Stable picture** Even played back pictures of VTR can be displayed without jittering.
- **Looping video input** Video input can be looped through with built-in termination switch.
- **External sync operation** (available as option for U and C types)
- **Compact construction** Two monitors are mountable side by side in a standard 19-inch rack.

WE ARE NOW STOCKING THE APPLE II AT REDUCED PRICES

AUTOSTART EURO PLUS



48K **£599** + VAT

Getting Started APPLE II is faster, smaller, and more powerful than its predecessors. And it's more fun to use too because of built-in features like:
- BASIC — The Language that Makes Programming Fun.
- High-Resolution Graphics (in a 54,000-Point Array) for Finely-Detailed Displays.
- Sound Capability that Brings Programs to Life.
- Hand Controls for Games and Other Human-Input Applications.
- Internal Memory Capacity of 48K Bytes of RAM, 12K Bytes of ROM; for Big-System Performance in a Small Package.
- Eight Accessory Expansion Slots to let the System Grow With Your Needs.

You don't need to be an expert to enjoy APPLE II. It is a complete, ready-to-run computer. Just connect it to a video display and start using programs (or writing your own) the first day. You'll find that its tutorial manuals help you make it your own personal problem solver.

GET YOURSELF A NEW MX70 PRINTER AND SAVE A FORTUNE

only **£249** + VAT



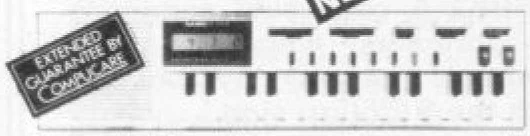
- 80 Column,
- Upper & lower case
- Apple dot Graphics
- Centronics Parallel
- Uni-directional.

TX80 — **£249** + VAT

EX-STOCK

CASIO VL TONE

NEW **£31.25** + VAT



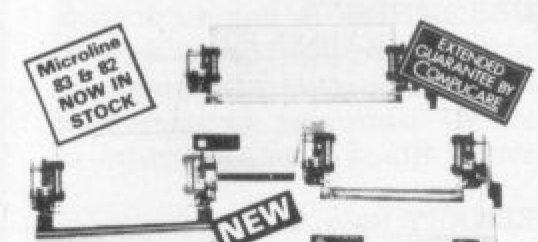
It's a new kind of musical instrument. A computer controlled synthesiser that helps you create, play and arrange compositions that normally take years of musical training.

CENTRONICS 737 DOT MATRIX PRINTER



only **£369** + VAT
including cables

Standard Features
- 80 CPS — Proportional Spaced Mode
- 50 CPS — Monospaced Mode
- Proportional Spacing, Plus 10 CP1 and 16.7 CP1
- N x 9 (Proportional) or 7 x 8 (Monospaced) Dot Matrix
- 7 x 8 Dot Matrix
- 3 Way Paper Handling System
- 96 Character ASC11 plus 6 European character sets
- Microprocessor Electronics
- Expanded Print
- Right Margin Justification
- Print Underlining
- 9-Wire Free Flight Print Head
- Bidirectional Stepper Motor Paper Drive
- Full One Line Buffer
- 21 LPM With 80 Columns Printed
- 58 LPM With 20 Columns Printed
- 6 Lines Per inch Vertical Spacing
- Paper Tear Bar
- Centronic Colours and Logo



MICROLINE 80 — **£299** + VAT

- 80 cps Uni-directional
- Small size: 342 (W) × 254 (D) × 108 (H) mm.
- 160 Characters, 96 ASCII and 64 graphics
- 3 Character sizes: 40, 80 or 132 chars/line
- Friction and Pin Feed
- Low noise: 65 dB
- Low weight: 6.5 kg

MICROLINE 82 — **£449** + VAT

- 80 cps Bi-directional logic seeking
- Small size: 360 (W) × 328 (D) × 130 (H) mm.
- 160 characters, 96 ASCII and 64 graphics, with 10 National character-set Variants.
- 4 Character sizes: 40, 66, 80 or 132 chars/line.
- Built-in parallel and serial interfaces.
- Friction and Pin Feed
- Low noise: 65dB
- Low weight: 8kg

MICROLINE 83 — **£779** + VAT

- 120 cps bi-directional logic seeking
- 136 column printing on up to 15in forms
- Small size: 512 (W) × 328 (D) × 130 (H) mm.
- 160 characters, 96 ASCII and 64 graphics with 10 National character-set variants
- 3 Character spacings: 5, 10 and 16.5 Chars/in.
- Built-in parallel and serial Interfaces
- Friction and Pin Feed
- Low noise 65dB
- Low weight: 13 kg

APPLE DISC II 3.3 Dos



EXTENDED GUARANTEE BY COMPUCARE

Disc with Controller **£349** + VAT
Additional Drives **£299** + VAT

- Powerful Disk Operating Software Supports up to 6 drives
- Name Access to Files for Ease of Use
- BASIC Program Chaining to Link Software Together
- Random or Sequential File Access to Simplify Programming
- Dynamic Disk Space Allocation for Efficient Storage
- Individual File Write-Protection Eliminates Accidental File Alterations
- Loads an 8K Byte Binary Image in 6.5 sec. (1.2 sec. in Pascal)
- Storage Capacity of 116 Kilobytes (143K Bytes with Pascal) on Standard 5¼" Diskettes
- Powered Directly From the APPLE (Up to 6 Drives) for Convenience and High Reliability
- Packaged in Heavy-Duty, Colour-Coordinated Steel Cabinet

Colour Monitors for Apple — **£295** + VAT

NEW The PEDIGREE PETS



32K ONLY **£569** + VAT

RRP £795 for 32K

Very popular for home & business use. 8K Microsoft Basic in ROM. 32K with new improved keyboard. 12" screen.
Cassette Deck **£55** extra

8032 80 COLUMN PET



ONLY **£825** + VAT

The reliable value for money system with after sales support, instruction and training facilities and a wide range of programmes.

SALE MEMORY UPGRADES

16K (8 x 4116) **£15.90** + VAT
4K Compukit (8 x 2114) **£15.90** + VAT

COMMODORE VIC-20

ONLY **£179** + VAT



- **16 foreground colours**
- **8 background colours**
- **Real typewriter keyboard with full graphics**
- **Music in three voices and three octaves**
- **Language and sound effects**

THE VIDEO GENIE SYSTEM

Ideal for small businesses, schools, colleges, homes, etc. Suitable for the experienced, inexperienced, hobbyist, teacher, etc.

EG3000 Series
WITH NEW EXTRA KEYS!



16K **£279** + VAT

- 16K user RAM plus extended 12K Microsoft BASIC in ROM
- Fully TRS-80 Level II software compatible
- Huge range of software already available
- Self contained, PSU, UHF modulator, and cassette
- Simply plugs into video monitor or UHF TV
- Full expansion to disks and printer
- Absolutely complete — just fit into mains plug.

The Video Genie is a complete computer system, requiring only connection to a domestic 625 line TV set to be fully operational; or if required a video monitor can be connected to provide the best quality display. 51 key typewriter style keyboard, which features a 10 key rollover. Supplied with the following accessories:- • BASIC demonstration tape; • Video lead; • Second cassetee lead; • Users manual; • BASIC manual; • Beginners programming manual. Write useful programs in the BASIC computer language yourself.

VIDEO GENIE EXPANSION BOX

EXTENDED GUARANTEE BY COMPUCARE

Complete with RS232 interface and floppy disc controller. O memory. **£225** + VAT

Memory expansion card (S100) 16K **£110** 32K **£159** + VAT

NOBODY CAN GET NEAR OUR PRICES EXCEPT OUR CUSTOMERS

VIC-20

THE PERFECT XMAS GIFT

THE FIRST FULL FEATURED COLOUR COMPUTER AT UNDER £200 ! !



YOU AND YOUR FAMILY CAN ALL ENJOY THIS TERRIFIC NEW MACHINE

LOOK AT THESE FEATURES

- ★ Sound
- ★ Colour
- ★ Programmable function keys
- ★ 15K memory, expandable to 32K
- ★ Uses standard 'Pet' Basic
- ★ Full size typewriter keyboard
- ★ Graphics character set
- ★ Plug-in memory cartridge
- ★ Low priced peripherals

Get hold of yours from us

IBEK SYSTEMS

437 Stoney Stanton Road.
Coventry.
CV6 5EA
West Midlands
Tel: (0203) 86449

Circle No. 146

APPLE SOFTWARE

Alien Rain (Galaxian) — Colour + hi-res version of pub game.	£13.95	M48K
Alien Typhoon — A much more difficult version of Alien Rain.	£13.95	M48K
Apple Panic — Chase little apples up and down ladders.	£16.95	M48K
Autobahn — Road race game with sound and hi-res graphics.	£14.95	M48K
Both Barrels — 2 hi-res action games on one disk.	£12.95	A48K
Cranston Manor — A new hi-res adventure like Wizard and the Princess.	£19.95	M48K
Cyber Strike — 3-D hi-res action adventure in space.	£19.95	M48K
Demon Derby — (Hyper Head-On) 4 skill level hi-res car race game.	£13.95	M32K
Galaxy Wars — Colour graphics + Sound effects + Hi-res.	£13.95	M32K
Gamma Goblins — Yet another superb hi-res action game.	£16.95	M48K
Gobbler — Eat up the dots but watch out for the Gobblers.	£13.95	M48K
Gorgon — Another superb pub game for your Apple.	£21.95	M48K
Hi-Res Cribbage — The title describes it. Even hear the pegs move.	£14.95	M48K
Hi-Res Soccer — English football for 1 or 2 players in hi-res.	£16.95	M48K
Missile Defense — Hi-res animation and sound arcade game.	£16.95	M48K
Mission: Asteroid — Hi-res adventure in 21 colours. Save the World!!	£10.95	M32K
Mystery House — Hi-res adventure using over 100 pictures.	£12.95	M48K
Oldorf's Revenge — Hi-res adventure with 100 rooms.	£11.95	A48K
Operation Apocalypse — Four computer simulations of World War II.	£35.95	A48K
Orbitron — Fight off enemy forces and avoid meteor showers.	£14.95	M48K
Pegasus II — The pub game now available on your Apple.	£16.95	M48K
Pool 1.5 — Hi-res graphics pool table simulation. 4 games in colour.	£19.95	M48K
Pulsar II — 2 superb hi-res games on one disk.	£14.95	M48K
Shuffleboard — Real time hi-res game for 1 or 2 players.	£19.95	M48K
Sneakers — Waves of little creatures attack you in hi-res.	£16.95	M48K
Snoggle (Puckman) — Hi-res maze of ghosts. Great fun.	£13.95	M48K
Space Eggs — Hi-res super-fast arcade style game.	£14.95	M48K
Space Warrior — Hi-res pub game.	£13.95	M48K
Tarturian (Wizard) — Another hi-res adventure with 160 rooms.	£14.95	A48K
The Shattered Alliance — Swords and Sorcery on a far-flung world.	£35.95	A48K
The Warp Factor — 1 or 2 player hi-res Star Trek/Space War game.	£23.95	A48K
The Wizard and the Princess — Hi-res adventure in 21 colours.	£18.95	M48K
Threshold — Hi-res space ship battle with aliens.	£16.95	M48K

A: Requires Applesoft in ROM. M: Will run on any Apple II.

WE DON'T JUST SELL GAMES. We can also supply Visicalc, Wordstar, Z80 Softcard, 16K Ramcards, etc. at very competitive prices. If you want anything Apple please contact us. WE ALSO OFFER A BESPOKE SOFTWARE SERVICE WHICH IS SECOND-TO-NONE.

PRICES INCLUDE VAT AT 15%. Add 50p P+P for orders under £30 totally. Please write or telephone for your free copy of our up-to-date software list.

DEALER INQUIRIES INVITED.

PERSONAL CALLERS BY APPOINTMENT ONLY PLEASE.

SPIDER SOFTWARE

98 AVONDALE ROAD, SOUTH CROYDON, SURREY
Tel: 01-680 0267 (24 hours a day — 7 days a week)

Circle No. 147

SILVERSOFT

personal computer software

ZX81/ 16K 'STARTREK'

16K STARTREK: GRAPHICS, 4-LEVELS OF PLAY, 8×8 GALAXY, STAR BASES, KLINGCNS, ROMULANS, PHOTON TORPEDOS, ETC.

GAMES PACK 1: STARWARS, HAMURABI, GRAPHIC LANDER, MASTERMIND, MINEFIELD

Prices: £4.95 each cassette; £8.95 for both

Further games packs coming soon.
Large S.A.E. for details.
Mail order only.

SILVERSOFT
40 Empress Avenue
Ilford, Essex
01-518 0877

Circle No. 148

HARD

A GUIDE TO THE LOW-COST COMPUTERS AV

ACORN ATOM Cambridge based Acorn Computers manufactures the Atom machine which has a memory capacity of 2K, but it can be upgraded to 12K.

It must be plugged into a television and is available in either kit form or ready built. As a kit it costs £120 for the 2K computer and £150 for the finished product. For a more powerful system, 12K, the price stands at £220 (in kit) and £250 completed.

Acorn also makes the Systems 1, 2, and 3 which cost between £69 and £750. These are available direct from Acorn or through the firm's distributors.

APPLE The Apple has a solid software base for both business and entertainment applications. The machine comes with a memory capacity, ranging from 8 to 48K. You can buy joysticks and paddles to plug in for use with computer games. Colour graphics can be used with a colour television.

The 48K machine costs £695 and is obtainable from Apple U.K., formerly Microsense, which is based in Hemel Hempstead, Hertfordshire.

ATARI 400/800 Most of the software for the Atari microcomputers are games or educational, with business applications only recently being Introduced.

The basic 400 with 16K RAM costs £340 direct from Atari's UK distributors, London-based Ingersoll Electronics. The 32K version sells for £395. Peripherals for the machines, like disc drive units and cassette recorders can also be obtained from Ingersoll for £325 and £45 respectively. The 800 is expandable to 48K and the 16K machine sells for £645.

BBC COMPUTER The computer adopted by the BBC to sell in conjunction with its forthcoming series is based on the Acorn Proton. The BBC has developed its own Basic to be used on the machine. Minimum memory is 16K RAM, maximum being 32K. Present plans for the machine are dual purpose, both business and games. Optional extras include joysticks, paddles, disc drives and a cassette for tape loading.

Price is put at £235 for the 16K computer and £335 for the 32K version.

DAI This is a personal computer made by Data Applications for both business use and home entertainment. The U.K. system (it is made in Belgium) has 48K RAM as well as full colour and sound commands. Data Applications is based in Cirencester, Gloucestershire. The 48K system now costs £595.

NASCOM There are two Nascoms available at the moment, both can be used for business and games. Tbe Nascom 2 is the more powerful of the two with 8K RAM and with a Basic interpreter.

It can be bought in kit form or off the shelf complete. The kit is £125 for 1K RAM and £140 for the finished 1K product. £225 will secure an 8K kit.

NEWBRAIN This is a hand-held computer unit which is at the low end of the price bracket. For 2K RAM you pay £159 upwards and it is expandable to 20K of memory. Hobbyists often opt for this machine because of its low cost and it is used for general business and for playing games. An expansion unit is available which supports floppy disc drives, a printer and a visual display unit. It is available from the Grundy Group.

OHIO SCIENTIFIC Ohio Scientific (OHI) makes the Superboard which is aimed at the hobbyist market. Its memory capacity starts at 4K RAM and is expandable to 32K if you buy the add-on board.

Other machines in this family include the Challenger 1, 2, 3, and 4. These are essentially cased versions of Superboard. The Challenger 4 is the cheapest of these at £450 and is similar to the Challenger 1 but has colour and sound options.

PET Made by Commodore Business Machines, the Pet ranges from 8K RAM to 32K RAM. They are used mostly by small businesses for general applications but have a hefty hobbyist following. It is available from Commodore of Slough or their many UK dealers at a starting price of £460. Compatible peripherals are available for the Pet, including disc drives, cassettes for loading tapes and printers.

SHARP MZ-80K One of the more expensive personal computers on the market it is used for both business and home entertainment. Memory capacity for the machine starts at 16K with a top limit of 48K and disc drives or cassette as required. The price is £460 for the 48K unit with add-on units costing extra.

SHARP PC-1211 The smallest computer in the Sharp range. Sharp classifies it as a pocket computer and it is programmable in Basic. It also has a cassette interface for loading and costs upwards of £85 from Sharp itself in Manchester or from its appointed dealers.

CORE

AVAILABLE IN THE U.K.

SINCLAIR There are two types of Sinclair microcomputer available for under £100. Sinclair really brought the microcomputer into the home: The machines are ideal for learning the rudiments of computing but are limiting graphically. The ZX80 has 1K of memory and is no longer in production. The ZX81 sells for £49.95 for 1K in kit form. The 16K RAM packs cost £49.95.

SORCERER The Exidy Sorcerer is a home computer with a sizeable games following but it is one of the more expensive of the microcomputers, costing upwards of £749. Memory amount ranges from 48K to 55K and there is a plug-in ROM pack for extra capacity. Disc drives and visual display unit are an additional cost. Sorcerer's can be obtained from a Cornish firm, Liveport of St Ives.

TI-99/4 This computer has recently been re-launched by Texas Instruments. It consists of a separate keyboard with graphics facilities in full colour and now plugs into a UK television. Software available for it from Texas Instruments is mostly business and educational but the firm has recently introduced a bundle of games to run on the computer. It has 16K RAM and uses tapes, discs or plug in games cartridges. You can buy one of these from T.I. itself or through some of the high street retailers like Rumbelows for £299.

VIC-20 The VIC is the much publicised baby of the range of microcomputers from Commodore of Slough. At £185 it is one of the cheapest. Deliveries to dealers have just started. The VIC has full colour graphics on a colour T.V. and there are joysticks available. Although Commodore are plugging the business use of the machine it is also tipped to be a hot games computer because of its colour graphics and low cost.



TANDY TRS-80 Tandy's TRS-80 Model 1 is a machine which is often used for games and is well-supplied with software for both entertainment and business applications. Its memory capacity goes from 4K to 16K but there is an expansion unit available upgrading it to 48K if you want the extra memory. The Model 1 is the cheapest of the Tandy range.

The Model 1 costs £459 but comes complete with a monitor to use as a VDU and a cassette. The Model III is an integral unit made up of a keyboard, 12 inch screen and two slots for $5\frac{1}{4}$" discs and has a printer interface. It costs from £499.

TANGERINE Tangerine Computer Systems produces the Microtan 65, a microcomputer for games and personal use like household accounts. It comes in kit form and is expandable from an initial 1K memory up to 48K of RAM. The Microtan 65 costs £79.35 for the 1K kit, or £90.85 assembled. Tangerine is based in Ely, Cambridgeshire.

VIDEO GENIE The Genie is made by E.A.C.A. and is a popular games machine. It is compatible with the Tandy TRS-80 Model 1. With 16K to 48K RAM there are disc drives available. The basic unit costs from £369 and is available from Lowe Electronics of Matlock in Derbyshire.

U.K.101 This machine comes in either kit form or ready built with memory capacity of 4K to 40K (with an expansion board). It contains television and cassette interfaces so you don't need a V.D.U. The U.K.101 is a popular computer for playing games and there is a lot of software around for it. The kit costs £149 for 4K, ready built, it sells for £199.

AD INDEX

Acorn 98, 99
Acornsoft 54
Adda 16
Braintree Micro Leisure 98
Bug Byte 18
Calisto Computers Ltd .... Back Cover
Carnell Software 97
Castle Electronics 34
Compshop 93
Computer Centre 82
Computer Games 89
Computershack 64
Comserve 80
Control Technology 95 & 96
Dk-tronics 44
Eltec Services Ltd 89
Essential Software Company 73
Everyman 88
The Gamer 96
Games Centre 88
Gemini 56
Hewson Consultants Ltd 56
Highlight Software 91
Ibek 94
Kansas City Systems 44
Kramer & Co 76
Landau 63
Lowe Electronics 69
Macronics 56
Maplin Electronic Supplies Ltd 40
Microdeal 97
Microdigital 10
Microstyle 6
Midwich 54
Molimerx 8
Morriston 97
Mountaindene 90
Mr Micro Ltd 91
Michael Orwin 91
Printivity 91
Q-Tek Systems Ltd 82
Quicksilva 88
SBD Software 63
Sharp 4
Sharpsoft 95
Silica Shop 26
Silicon Centre 56
Silicon Chip 53
Silver Soft 94
Sinclair .... 21 & 22-23
W H Smith 28
Spider Soft 94
Surrey Micro Systems 76
Twickenham Computer Centre 89
Video Services Bromley 76
Voltmace 98
Ward Electronics 88
John Wiley & Associates 63
ZX81 Users Club 64
Zynar 2



CHOOSE ATOM POWER

At work or play – everything you need in a personal computer

The Atom is a machine to be used. Every day, day after day. It's a full function machine – check the specification against others. It's rugged, easy to operate built to last and features a full-size typewriter keyboard.

Just look at some of the features!

- More hardware support than any other microcomputer
- Superfast BASIC – can be updated to BBC BASIC if required
- High resolution and comprehensive graphics ideal for games programmers and players*
- Integral printer connection*
- Software available for games, education, maths, graphs, business, word processing, etc.
- Other languages: Pascal, FORTH, LISP
- I/O port for control of external devices
- Built-in loudspeaker
- Cassette interface
- Full service/repair facility
- Users club

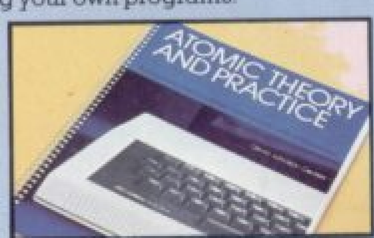
* Expanded version only

Optional Extras

- Network facility with Econet
- Disk
- PAL UHF colour encoder
- Add-on cards include 32K memory, analogue to digital, viewdata VDU, disk controller, daisywheel printer, plus many, many more!
- Power supply

FREE MANUAL

The Atom's highly acclaimed manual comes free with every Atom and leaves nothing out. In just a while you'll be completely at ease with your new machine! Within hours you'll be writing your own programs.



YOU AND YOUR CHILDREN

More and more schools are buying Atoms. More and more children will learn on an Atom. You can give them that extra familiarity with an Atom in the home.

ACORN COMPUTER 4a Market Hill, CAMBRIDGE CB2 3NJ

When you order your Atom we will include full details of all software packs and the optional hardware.

To: Acorn Computer Limited, 4A Market Hill, Cambridge CB2 3NJ.

I enclose a cheque/postal order for £. . . . .

Please debit my Access/

Barclaycard No . . . .

Signature . . . .

Name (please print). . . . .

Address . . . .

. . . .

Telephone Number . . . .

Registered No. 1403810 VAT No. 215 400 220

Quantity	Item	Item price inc. VAT + P&P	Totals
	Atom Kit 8K ROM + 2K RAM	@ £140.00	
	Atom Assembled 8K ROM + 2K RAM	@ £174.50	
	Atom Assembled 12K ROM + 12K RAM	@ £289.50	
	Power Supply	@ £ 10.20	
		TOTAL	

ATOM SOFTWARE is designed and produced by Acornsoft, a division of Acorn Computers, Trust the manufacturer to get the very best from its own product. Current software includes word processing, maths packs over 30 games, database, Forth and business packages.



Write to Acornsoft, 4a Market Hill, Cambridge for full details and prices.

Circle No. 154

SEE OUR DEALER LIST ON PAGE

THE ATARI® RANGE



ATARI HARDWARE

400 16K	£345
800 16K	£645
410 (Recorder)	£50
810 Disk Drive	£345
80 Col. Printer	£550
Paddles Pair	£12
Joysticks Pair	£12

ATARI SOFTWARE

Star Raiders	£29.95
Missile Command	£29.95
Asteroids	£29.95
Space Invaders (Rom)	£24.50
Space Invaders (Cassette)	£12.95
Basket Ball	£24.50



ATARI SOFTWARE FROM DYNACOMP

Stud-Poker	16K(C)	£10.99
Moon Probe	16K(C)	£9.99
Alpha Fighter	24K(C)	£11.99
Intruder Alert	16K(C)	£15.99
Giant Slalom	16K(C)	£12.99
Monarch	16K(C)	£10.99
Crystals	24K(C)	£9.99
Dominoes	24K(C)	£15.99
Chomp-Reversi	16K(C)	£10.99
Management Simulator	24K(C)	£15.99

CRYSTALWARE

House of Usher	D	£19.99
Galactic Quest	D	£19.99
Sumer	D	£11.99
Laser Wars	D	£19.99
World War 3	D	£19.99
Beneath the Pyramids	D	£19.99
Sands of Mars	D	£26.99
Little Crystal	D	£26.99
Fantasy land 2041	D	£34.99
Waterloo	D	£32.99
Quest for Power	D	£26.99

ATARI SOFTWARE FROM ADVENTURE INTERNATIONAL

Adventures 1-12	24K(C)	£16.50
Star Trek 3.5	24K(C)	£16.50
Sunday Golf	16K(C)	£12.50
Angle Worms	16k(C)	£12.50
Mountain Shout	16K(C)	£12.50
Deflections	16K(C)	£12.50
Lunar Lander	24K(C)	£12.50
Galactic Empire	24K(C)	£16.50
Galactic Trilogy	24K(C)	£16.50

B-1 Nuclear Bomber	16K(C)	£12.50
Midway Campaign	32K(C)	£12.50
North Atlantic Convoy Raider	16K(C)	£12.50
Planet Miners	24K(C)	£12.50
Lords of Karma	40K(C)	£17.50
Computer Acquire	N/A	£17.50
Conflict 2500	32K(C)	£12.50
Empire of the Overmind	40K(C)	£24.95
Tanktics	24K(C)	£19.95

Helicopter Battle	16K(C)	£9.95
Tractor Beam	8K(C)	£9.95
Keno	8K(C)	£9.95
Horse-racing	16K(C)	£9.95
Supermaster	8K(C)	£9.95
Mad Marble	8K(C)	£9.95
Lightning Bolts & Reaction	16K(C)	£9.95
Tag	16K(C)	£9.95
War at Sea	16K(C)	£14.95

We also carry a large range of software for TRS-80 and Apple computers send 50p for catalogues.

(C) = Cassette

All prices include VAT

Trade enquires for software welcome.
Mail order available all prices include P & P

CALISTO
COMPUTERS LIMITED

SPECIALISTS IN MICROCOMPUTER HARDWARE & SOFTWARE

119 John Bright Street, Birmingham B1 1BE. Phone 021-632 6458.

Circle No. 301